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GEOPHYSICAL OBSERVATORY REPORTS

1999/2001

OF THE GEODETIC AND GEOPHYSICAL
RESEARCH INSTITUTE OF THE HUNGARIAN
ACADEMY OF SCIENCES

+CD-ROM

YEAR

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NAGYCENK GEOPHYSICAL OBSERVATORY



SOPRON

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NAGYCENK GEOPHYSICAL OBSERVATORY

IAGA CODE: NCK

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SOPRON

2003

**MAGYAR
TUDOMÁNYOS AKADÉMIA
KÖNYVTÁRA**

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Preface

The Széchenyi István Geophysical Observatory of the Hungarian Academy of Sciences is pleased to present the 1999–2001 report in the Geophysical Observatory Report series.

Nagycenk Geophysical Observatory has been supplying data since 1957. Geophysical Observatory Reports comprise earth current data from 1957 on, geomagnetic data from 1961 on, atmospheric electricity data from 1962 on and ionospheric data from 1967 on.

Further information and data including archived data are available by special arrangement at the institute:

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Sopron, March 2003

V. Wessztergom

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I. DESCRIPTION OF THE OBSERVATORY

V. WESZTERGOM

Nagyecenk Geophysical Observatory was founded in 1956–1957 and it has been operated since then by the Geodetic and Geophysical Institute of the Earth Science Center, Hungarian Academy of Sciences.

The observatory is situated about 10 km to E of the city Sopron and 60 km SE of Vienna, on the southern shore of lake Fertő. The observatory lies on thick conductive sediment preserving the site from far industrial noise and it is surrounded by the Fertő-Hanság National Park which helps to shelter the long term measurements from any change caused by nearby manmade activity.

The co-ordinates of the observatory

3-character IAGA code: **NCK**

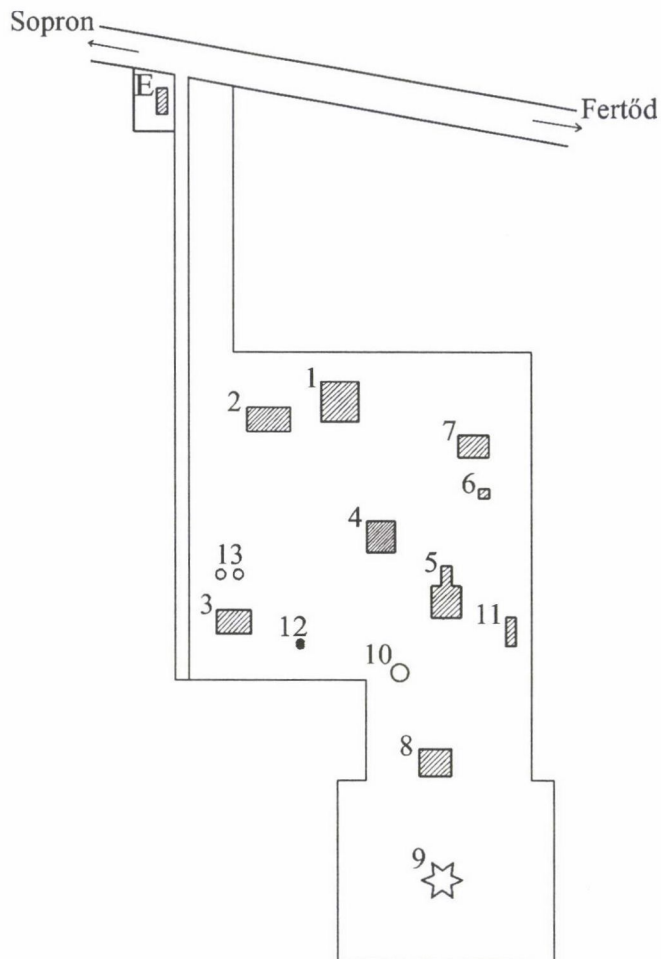
Geographic co-ordinates:

φ	=	47°38' (N)
λ	=	16°43' (E)
Altitude	=	153.70 m (magnetic house)
McIllwain L	=	1.9

Measurements and reports started in 1957 (International Geophysical Year) with earth current data. The potential differences are measured in N-S and E-W directions with electrode spacings of 500 m. Low polarization lead plate electrodes are buried about 2 m below the surface. Potential differences are recorded with 1 sec and 10 sec sampling rate.

Continuous observation of atmospheric electricity started in 1961. Slow variation (DC component of vertical atmospheric electric field) is measured between the ground and an electrode (at 1 m height) around which the potential is equalized by means of a radioactive collector. Potential gradient is recorded with 15 sec sampling rate. Point discharge is measured with stainless steel tip mounted on the roof of the atmospheric electricity building.

Table I. Observatory site diagram



E – Entrance, 1 – Main building with staff hostel and electronic laboratory, 2 – Telluric instruments and office, 3 – Atmospheric electricity centre (laboratory of Schumann resonance, potential gradient, point discharge and radio wave absorption measurements), 4 – Magnetic absolute house with four pillars, 5 – Underground magnetic variometer chambers, 6 – Proton magnetometer (DI/DD) hut, 7 – Computer centre (data loggers, server of local network, satellite transmitter) 8 – Ionosonde station, electric and mechanical workshop, 9 – Ionosonde D-antenna, 10 – Meteorological station, 11 – ELF induction coil chamber, 12 Ball antenna (Schumann resonance antenna), 13 – Potential gradient sensors

Continuous observation of geomagnetic elements with control of the absolute observations began in 1961. The observatory has belonged to the INTERMAGNET co-operation since 1993. Data are transmitted via METEOSAT satellite to geomagnetic information nodes and made also available to the international research community on CD ROM.

Since 1967 ionospheric measurements have also been carried out. Lower ionosphere is studied using A3 (oblique incidence, LF radiowave absorption) method.

The early nineties are to be considered as a transition period in the observatory again. Schumann resonance measurements started in 1993, an ionosonde station type IPS 42 works since 1996 and a scientific meteorological station was installed in 1996. The meteorological station is based on a Campbell CR10X measurement and control modul, temperature, humidity, wind speed, wind direction, rainfall and radiation sensors.

II. GEOMAGNETISM

ELECTRIC ACTIVITY INDICES

The 3-hour electric activity indices T for the E_x and E_y component, have a linear scale with a step of 1.8 mV/Km. The range of values is 0 to 9.

The index K_1 refers to complete days and expresses the activities in the period range 0–2 min (pulsations).

Limits between K1-values								
0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	8–9
2	4	7	13	18	23	29	41	54

These values are given in units of 10^{-5} V/km.

Values in brackets mean extrapolated data, where the lacking intervals were substituted by the average of recorded intervals.

Times are given in CET (i.e. UT + 1 h), nearly corresponding to LT (–7 min)

A detailed description of the processing and compilation is found in the Report of the Observatory for 1966 in German and Ádám A, Verő J, Cz. Miletits J, Holló L, Wallner Á: The geophysical observatory near Nagycenk. I. Electromagnetic measurements and processing of data (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 333).

See CD (program Seenck.exe, menu item Tellurics/Indices).

Date	T	Sum	Date	T	Sum
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990112	10011012	6	990222	21211131	12
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990121	01011000	3	990303	11131177	22
990122	01112534	17	990304	31346292	30
990123	21231335	20	990305	34232430	21
990124	43242351	24	990306	21121125	15
990125	31221111	12	990307	42421233	21
990126	10021001	5	990308	21121027	16
990127	11112221	11	990309	22225241	20
990128	00112111	7	990310	45434132	26
990129	11121202	10	990311	13235312	20
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990131	01010000	2	990313	11013111	9
990201	00000000	0	990314	20112422	14
990202	00000001	1	990315	22322111	14
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000907	22222243	19	001018	22333122	18
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MAGNETIC MEASUREMENTS AND DATA PROCESSING

V. WESZTERGOM

Recording of geomagnetic variations

Geomagnetic variations are recorded by the ARGOS system. ARGOS (developed by the Geomagnetism Group of British Geological Survey) is a PC based automatic observatory equipped with triaxial fluxgate and a proton magnetometer in a DD/DI configuration. The fluxgate variometer sensors are aligned in X, Y, Z directions. 10 second samples are used to provide minute values centred on the minute by means of a 7-point cosine filter. Reported elements are: H (horizontal), Z (vertical), D (declination) and F (total force). From the year 1993 on the minute values are transmitted through the METEOSAT satellite to the Edinburgh Geomagnetic Information Node.

Table I. Main specifications of ARGOS used in Nagycenk Observatory

Device	Resolution	Dynamic range	Temperature coeff.
Triaxial Fluxgate			
Magnetometer	0.1 nT	± 500 nT/ ± 400 nT	~ 1 nT/ $^{\circ}\text{C}$
Proton Magnetometer			
(ELSEC 820)	0.1 nT	10000–90000 nT	–

DI/DD coil system consists of two orthogonal sets of Helmholtz coils (proton head is mounted at the centre). Coils orientated so that one provides bias fields approximately perpendicular to F vector in the magnetic meridian and the other provides bias fields approximately perpendicular to F in the horizontal plane. DD and DI relative to the initial values (D_0 , I_0) are calculated. DD/DI proton magnetometer is used in every tenth minutes from which F and almost absolute values of D and I are obtained.

Satellite transmitter, 6800 Series of Data Collection Platform, was supplied by Space Technology Systems. Power output to antenna (two linearly-polarised Yagi arranged to give circular polarisation) is 4 watts at 402 MHz. Data storage capacity is 2×40 kbytes.

Timing is produced by the IBM clock corrected by the high stability crystal built in the Proton Magnetometer.

To ensure continuous recording a high stability torsion photoelectric magnetometer (type PSM-8711) has been run from 1 January 1998. Data along with telluric data are logged by a DR-02 type digital recording system. The PSM magnetometer records the H, D and Z component with an exceptionally high parameter stability. The baseline variation has never exceeded 1.5 nT/year. Maximum resolution is 3 pT, sampling rate applied is 10 s. Frequency response: 0.3 Hz to DC. Sensitivity to tilting: less than 10 nT/'.

Data are stored in the internal memory of the digital data logger DR-02. Both the PSM and the DR-02 was developed and provided by the Institute of Geophysics Polish Academy of Sciences.

Absolute control, baselines

Baselines of the variometer systems are derived from absolute observations. Prior to 1989 the baseline was controlled by two QHM, one declinometer and one BMZ. From 1989 till the end of 1994 the standard instrument for absolute measurements was the vector proton magnetometer (NVP) constructed in Niemegk Observatory. In 1994 an Overhauser proton magnetometer (type: GSM 19 of GEM Systems) and a fluxgate theodolite (developed by the Danish Meteorological Institute) was purchased. Since then the standard instruments are the fluxgate theodolite for I and D and the Overhauser effect proton magnetometer for F.

To determine the momentary angle of declination four observations (four null positions in the horizontal plane) are taken and it is repeated at least two times. Generally the closer azimuth mark is used but it is checked regularly with the far azimuth mark. Inclination angle is determined in the plain of the momentary magnetic meridian in the same way as D. Total intensity is measured simultaneously with I-measurements on the next (F) pillar with the Overhauser magnetometer. Absolute values of all geomagnetic elements are referred to the same pillar of the absolute hut. Observation is made weekly, occasionally more often.

Absolute measurements are supplemented by quasi absolute baseline reference measurements. Declination, inclination and total intensity are determined by means of a proton vector magnetometer in every ten minutes.

Data processing and availability

Sampling rate of magnetic variation data is 10s both for ARGOS and PSM. Minute mean values are produced with digital filter from the raw sampled data. According to the IAGA recommendation minute mean values are stored. Hourly means are calculated from minute means, yearly means are derived from hourly means. Final absolute values of H, D and Z field component are obtained from smoothed baselines.

ARGOS data are compared continuously to PSM data and gaps are filled.

Data are logged on floppy disk too. In addition to logging data to disk INTER-MAGNET V2.8 format satellite transmission packets are sent to DCP.

Presentation of the results

- plot of hourly mean values of H, D, Z
- plot of daily mean values of H, D, Z
- tables of geomagnetic activity indices, K
- table of annual mean values of geomagnetic elements
- special phenomena: SSC, sfe

See CD (program Seenck.exe, menu item Magnetism).

GEOMAGNETIC DATA

Hourly mean values of H, D, Z and F

Hourly means are derived from minute means corrected using absolute observations. The units of the elements are 0.1 nT, Declination is also scaled to 0.1 nT. Minute means of F are calculated from H and Z. F values are checked by comparing them with proton magnetometer readings taken at every 10 minutes.

Daily mean values of H, D, Z and F

Daily mean values are calculated from hourly mean values.

Geomagnetic activity indices: K-index

The K-index is determined from the amplitude ranges of H and D components for each three-hour Universal Time interval. Limit for K=9 is 350 nT in Nagycenk.

Special phenomena

List of special events is based on both magnetic and earth current records. Tables are given for SSC-s and sfe.

Annual mean values of geomagnetic elements

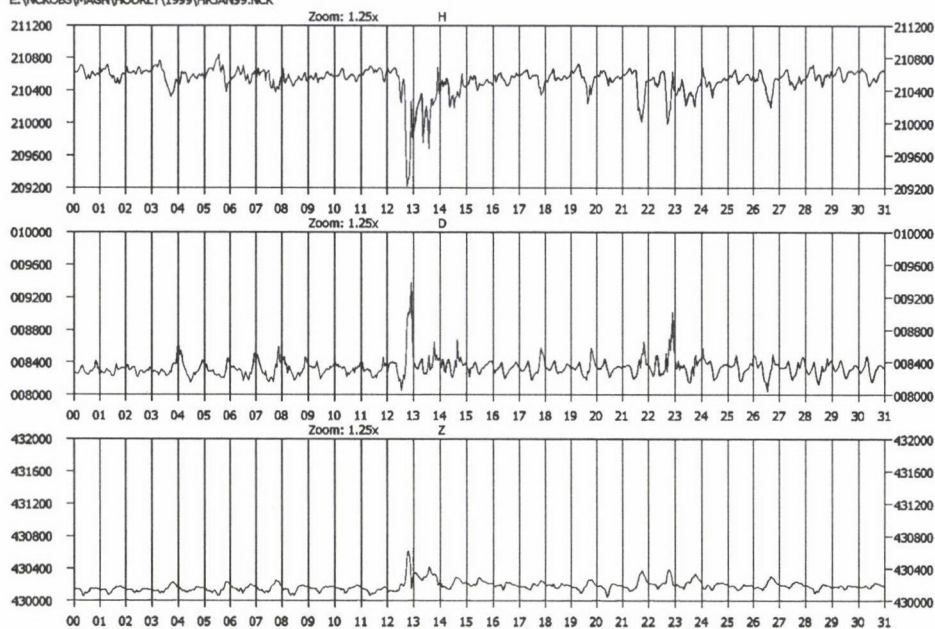
Table contains yearly means of the geomagnetic elements 1961 to 1993 in nT. These values are the results of a reevaluation of previously published data, including corrections eliminating disturbances caused by construction works in the observatory. Corrected values are noted by asterisk.

Times in this section are given in UT!

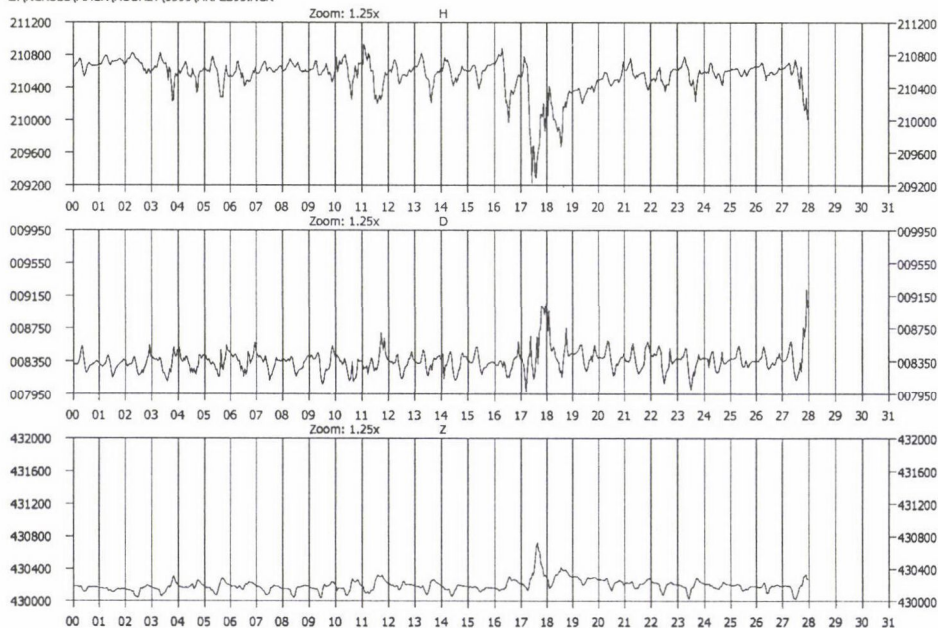
See CD (program Seenck.exe, menu item Magnetics).

Hourly mean values of H , D , Z
1999–2001

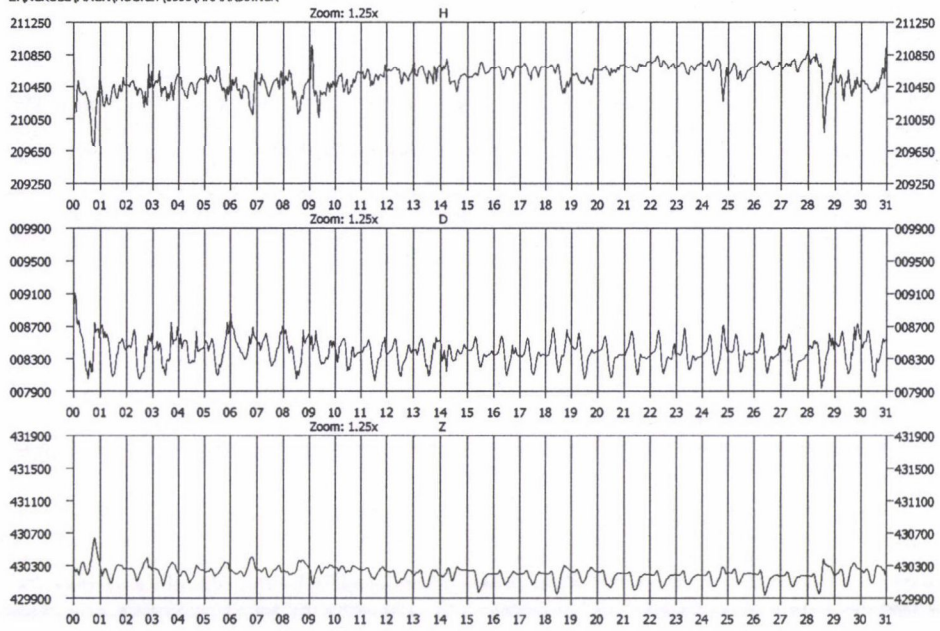
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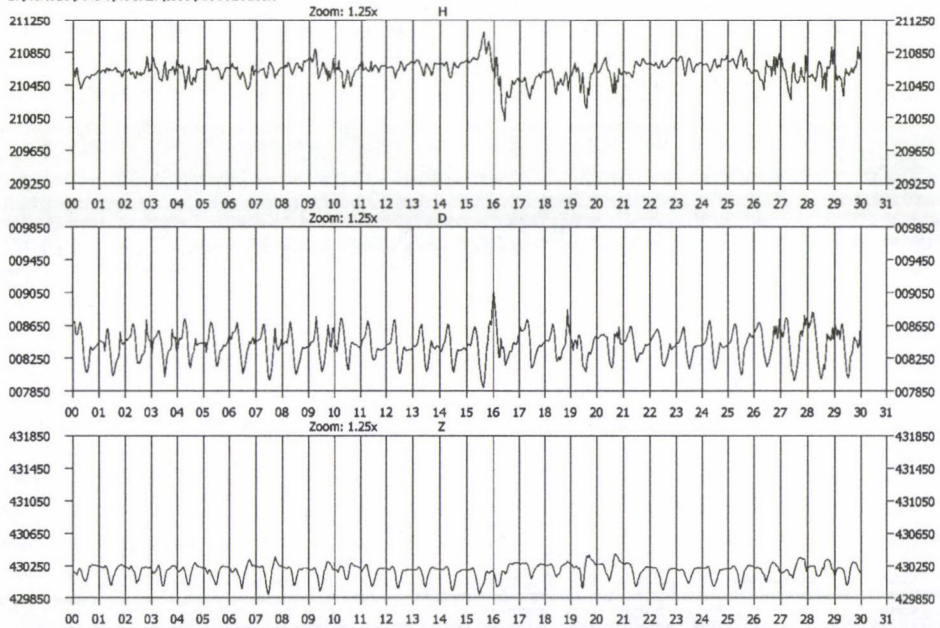
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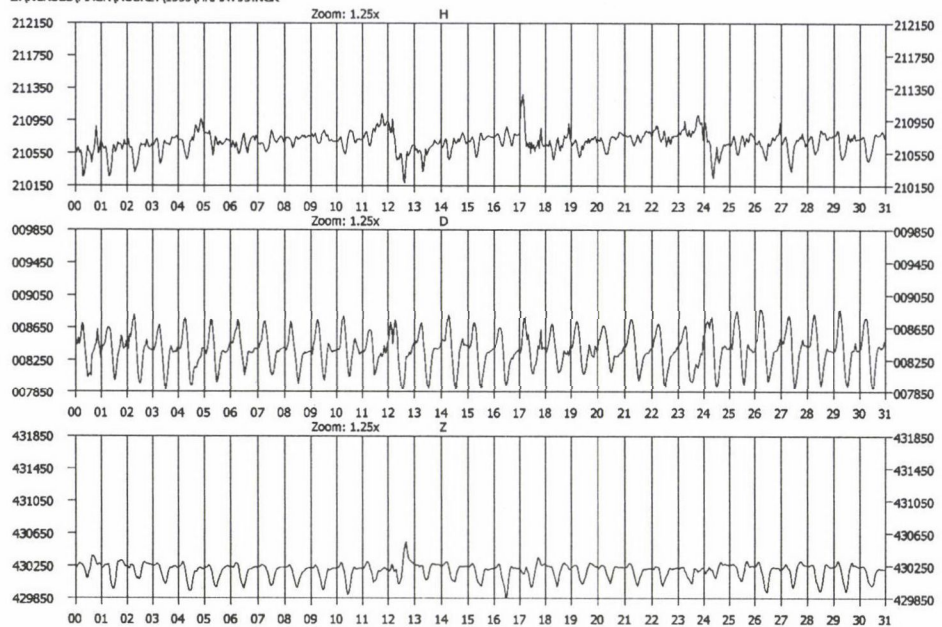
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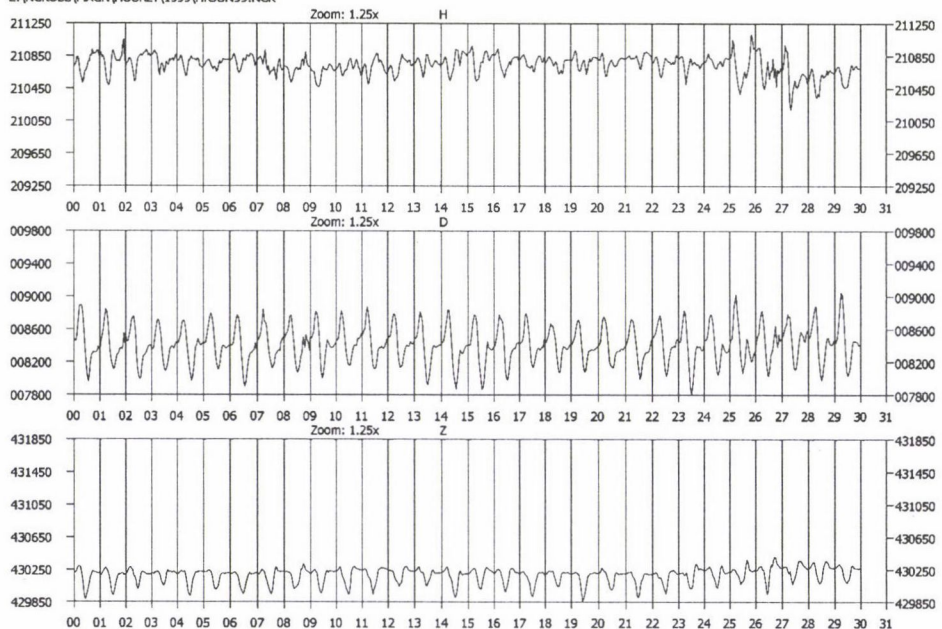
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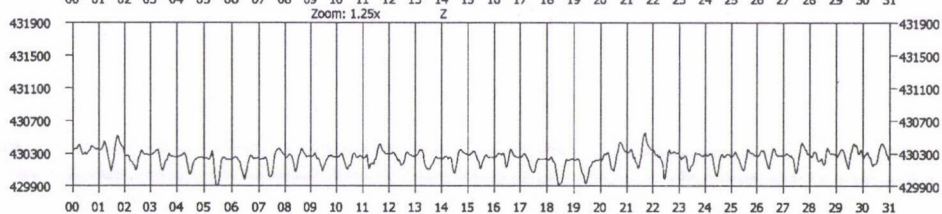
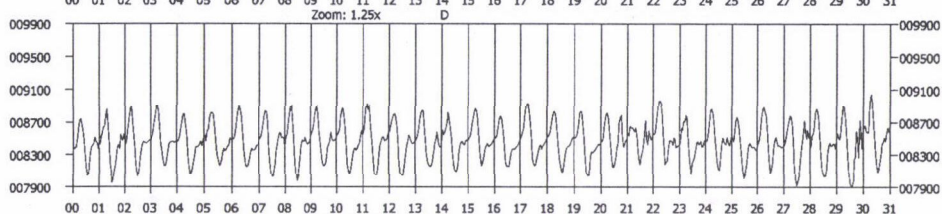
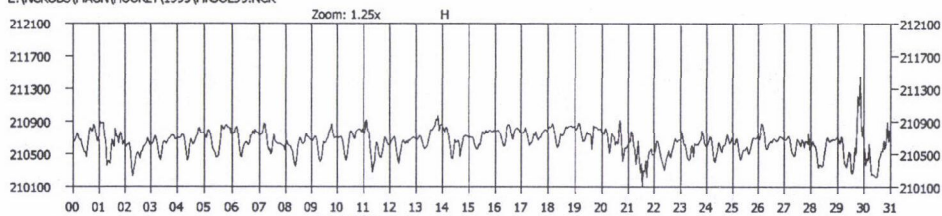
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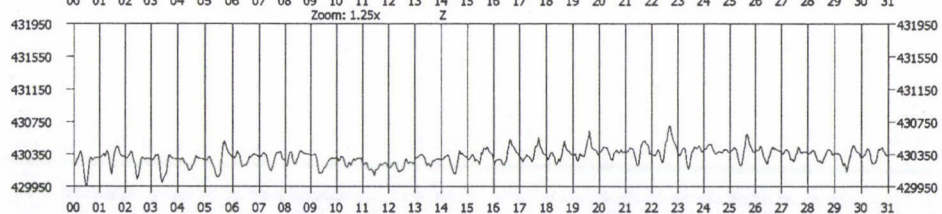
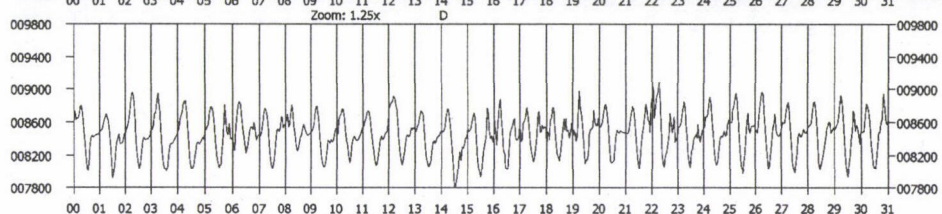
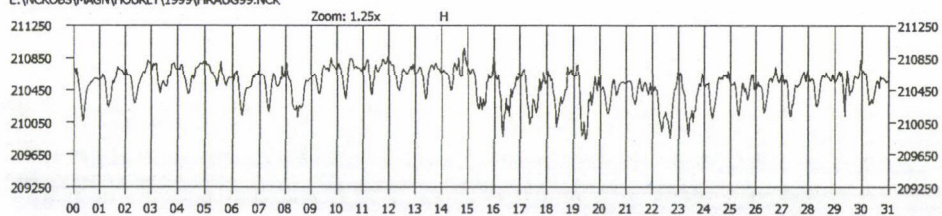
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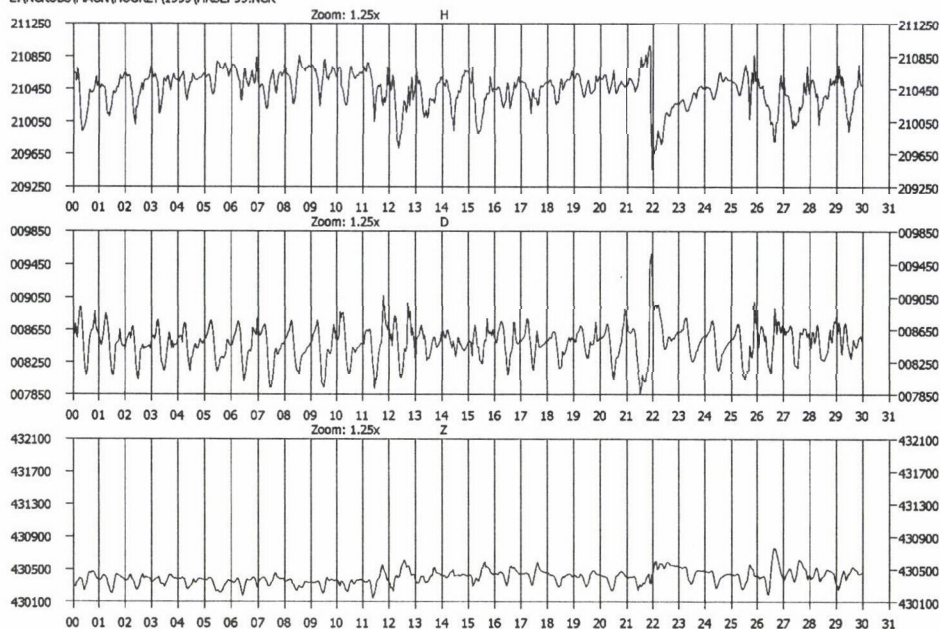
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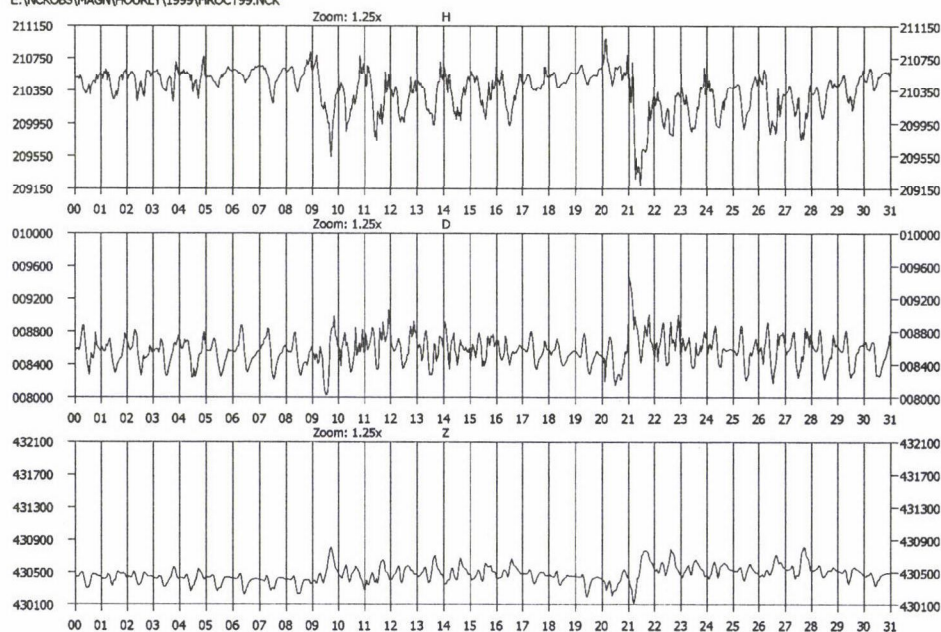
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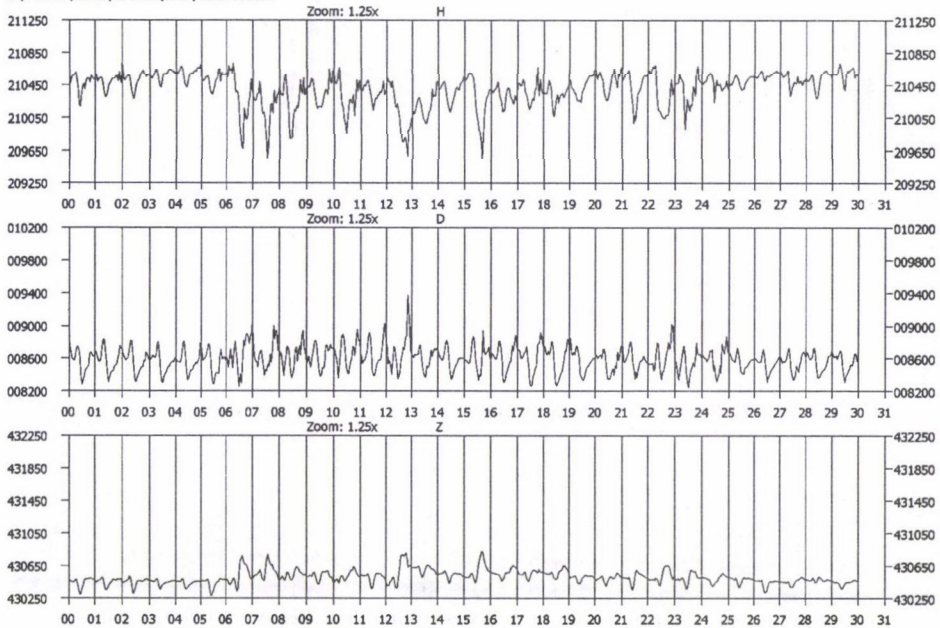
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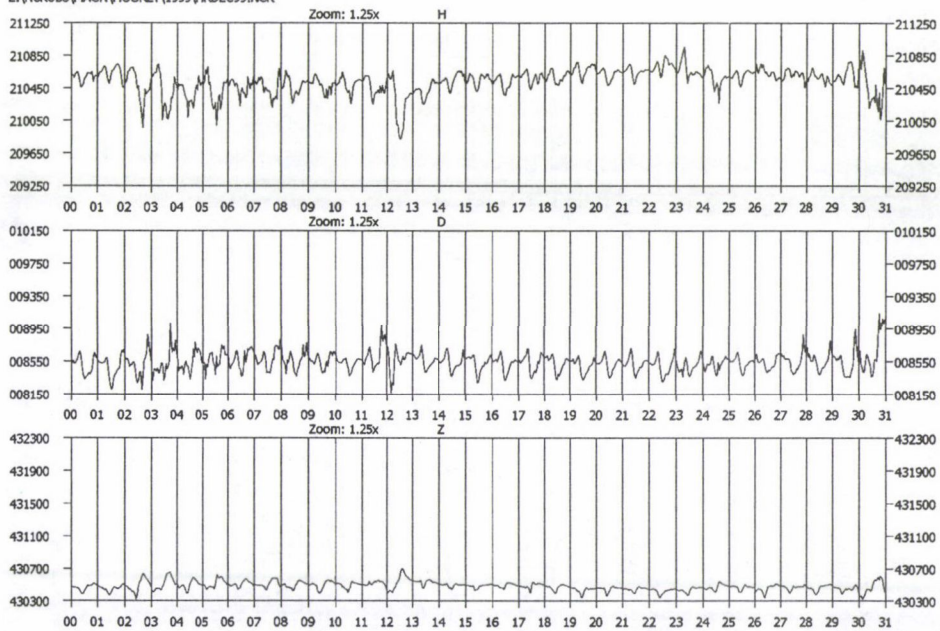
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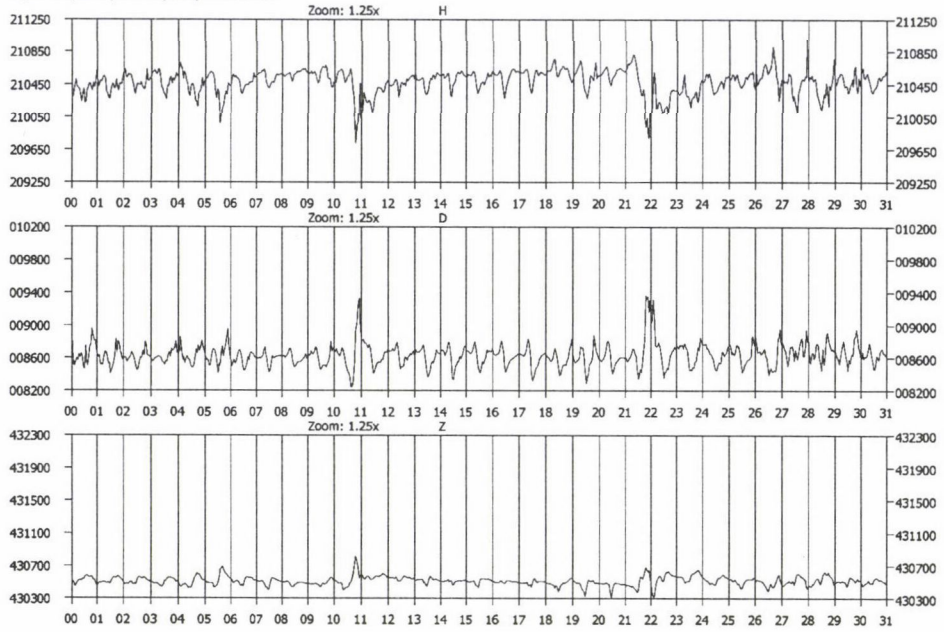
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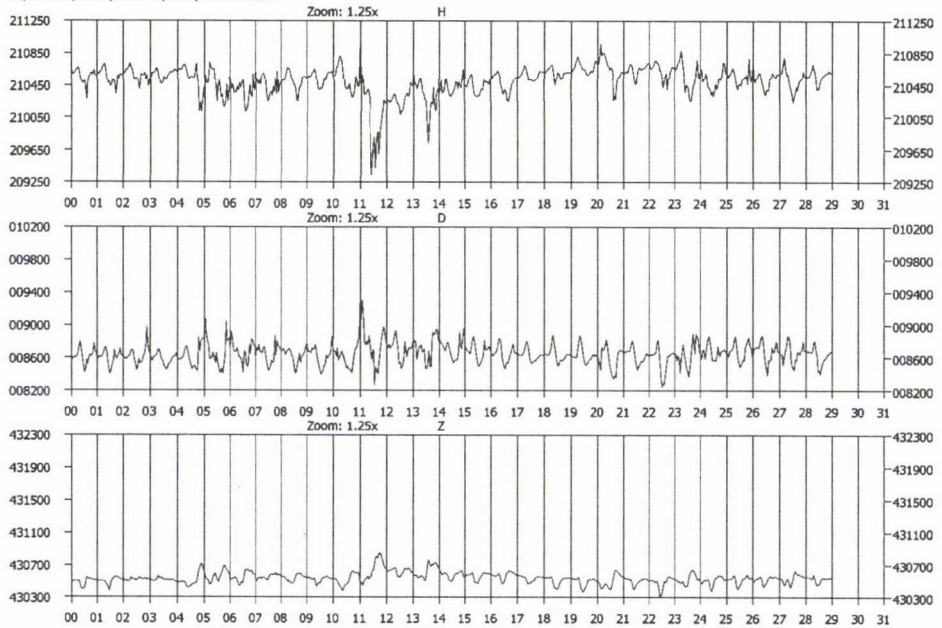
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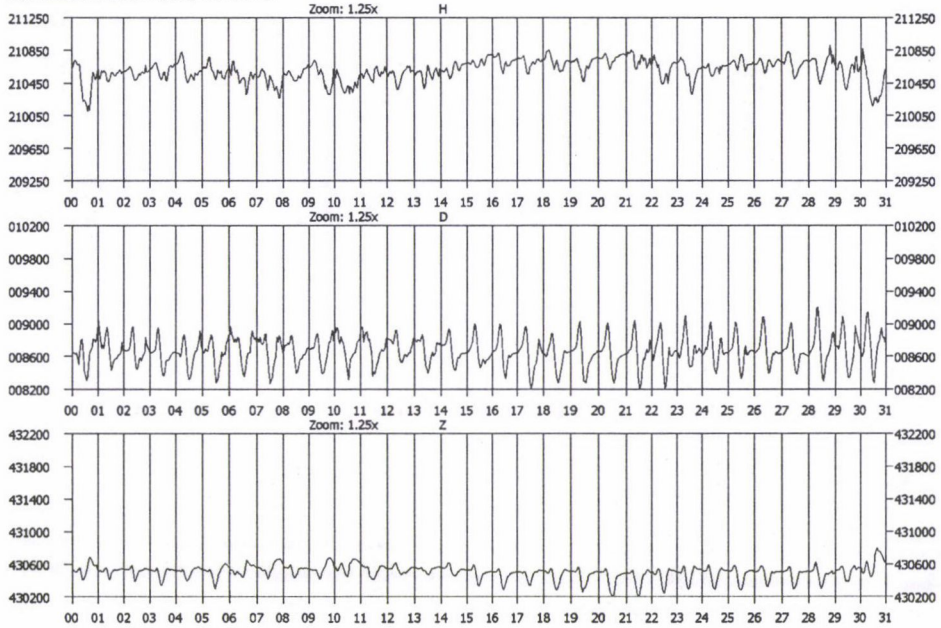
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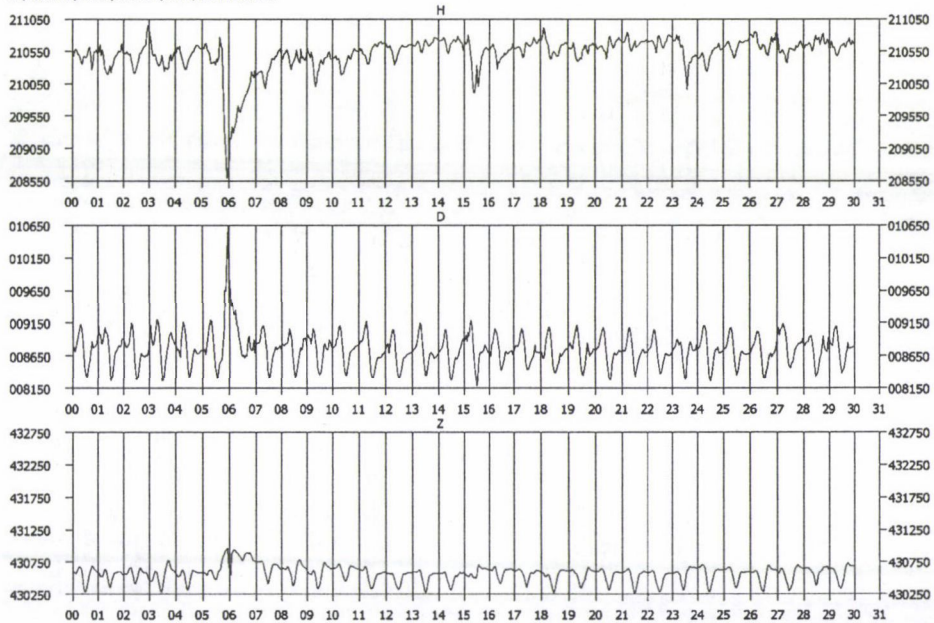
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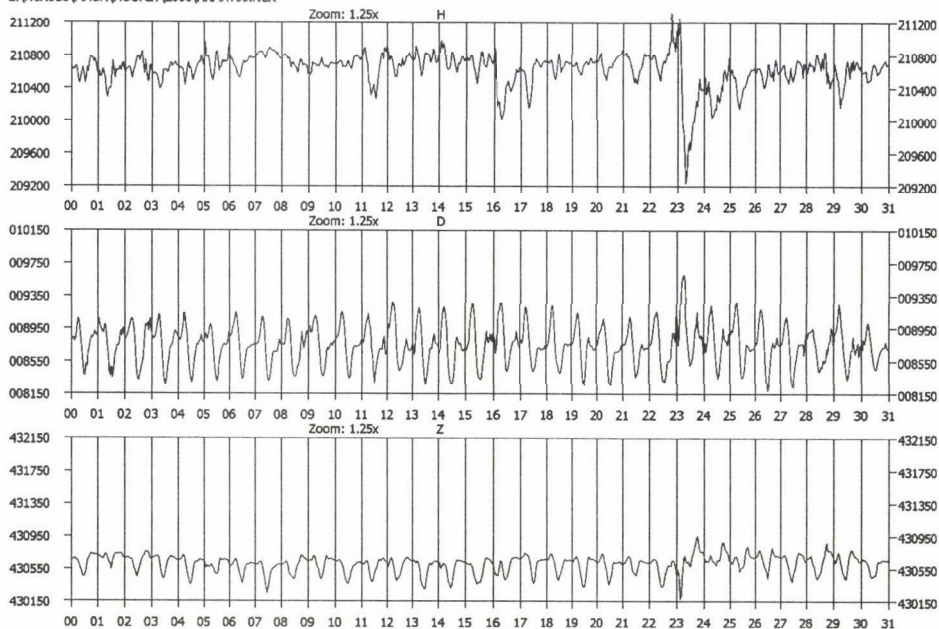
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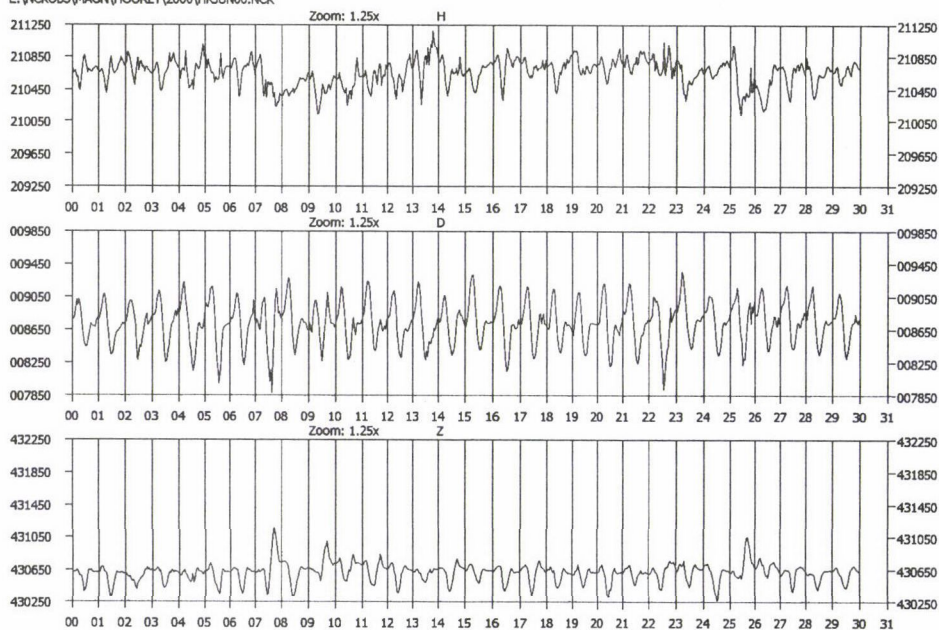
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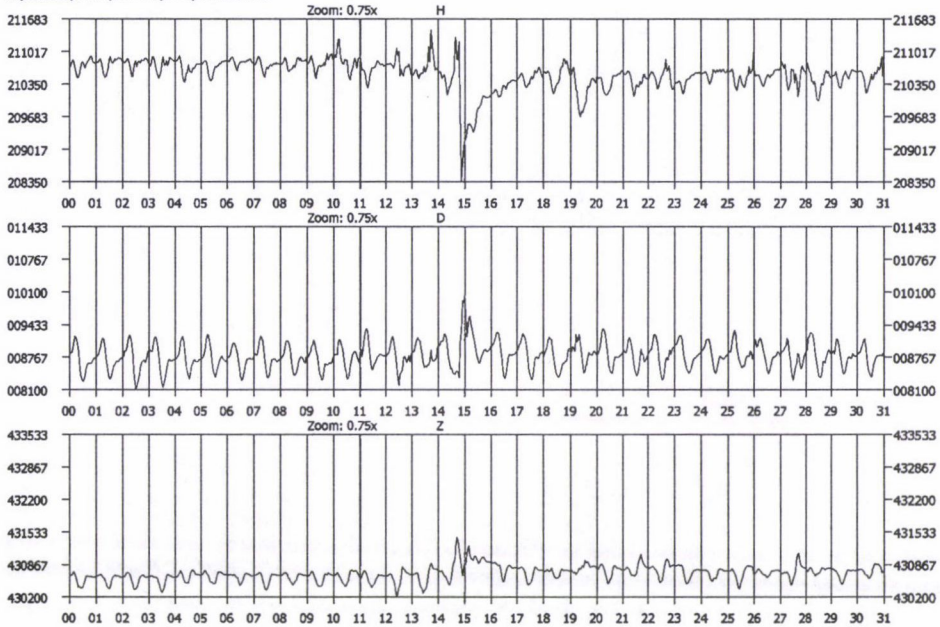
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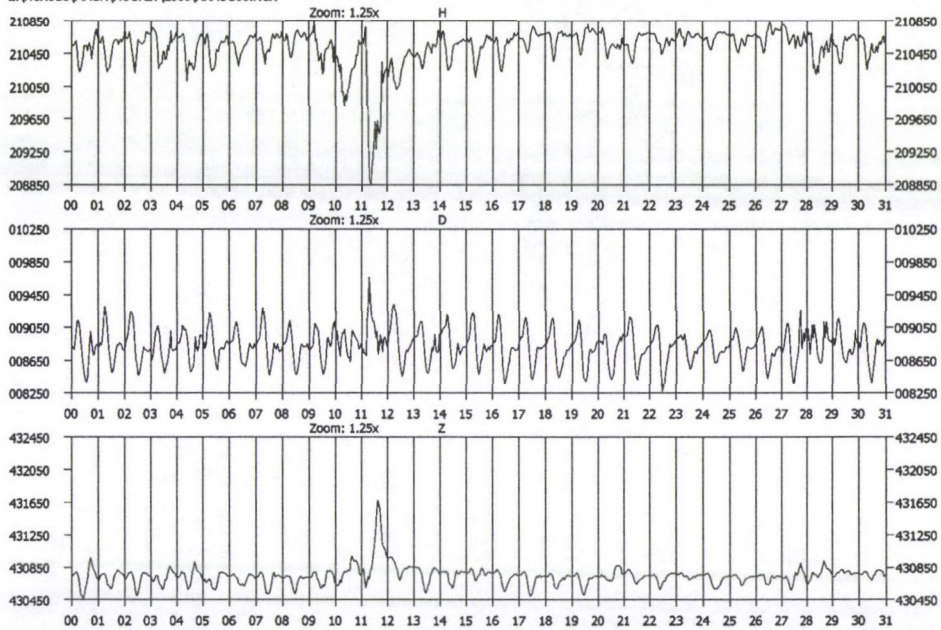
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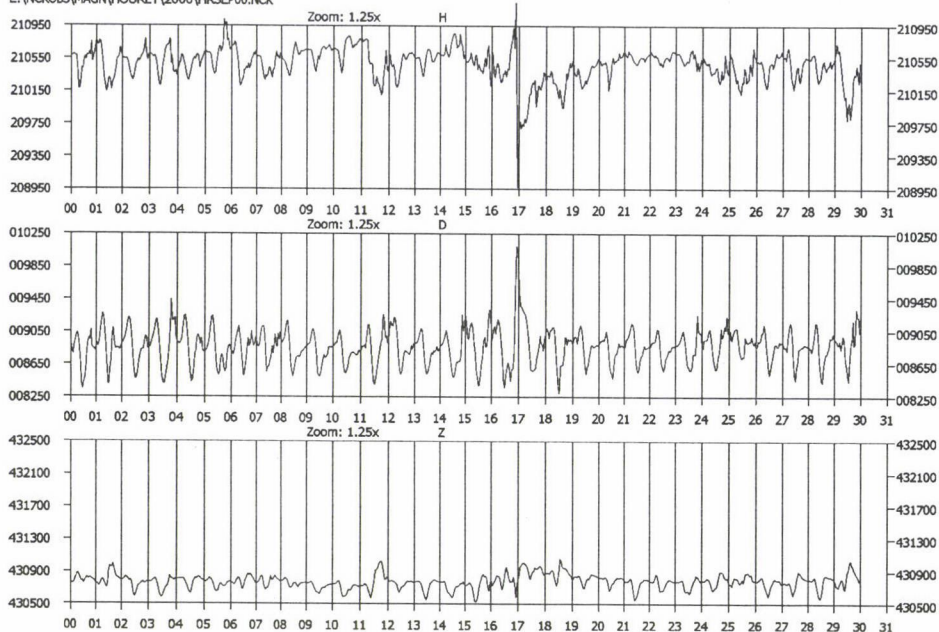
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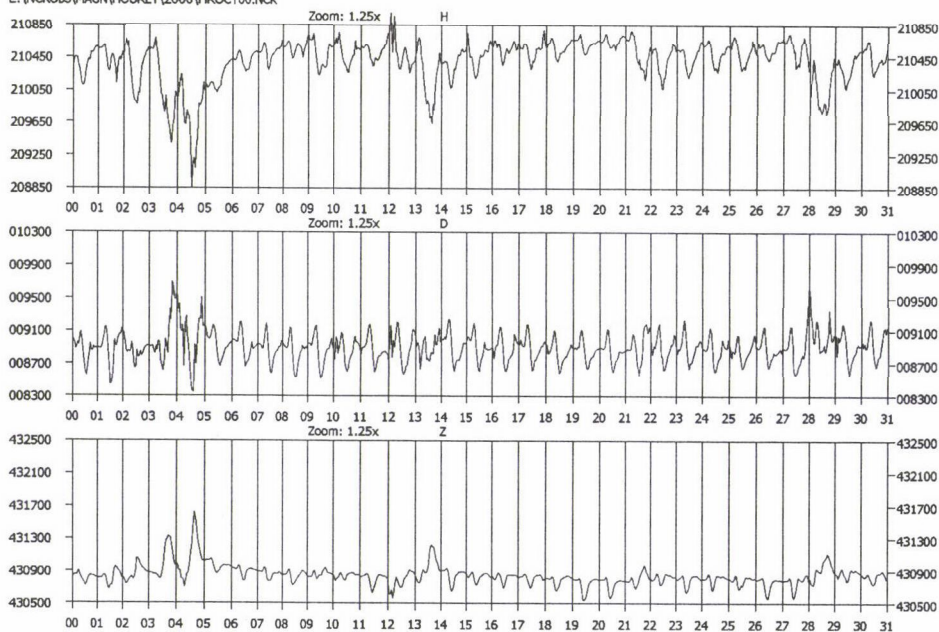
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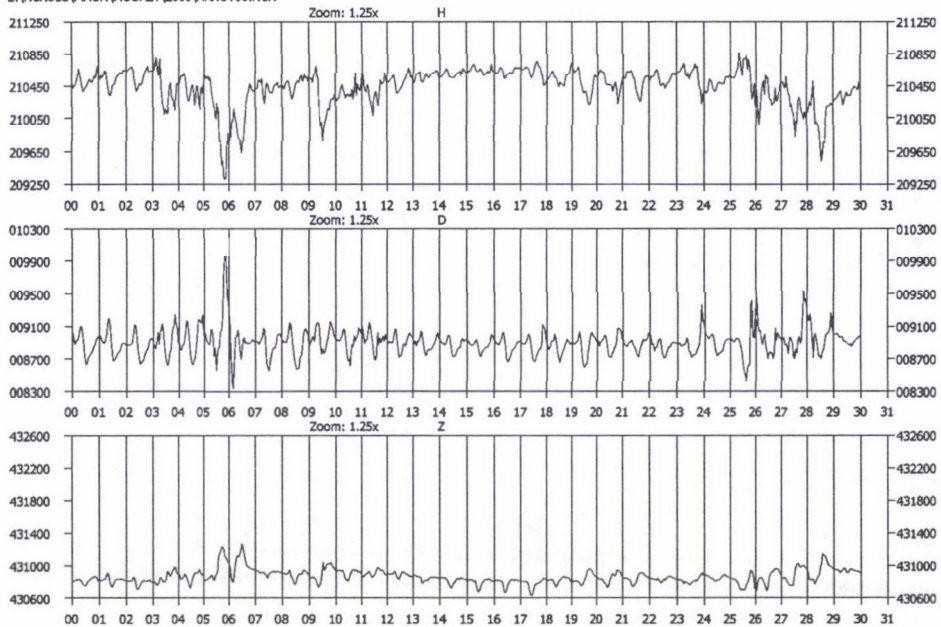
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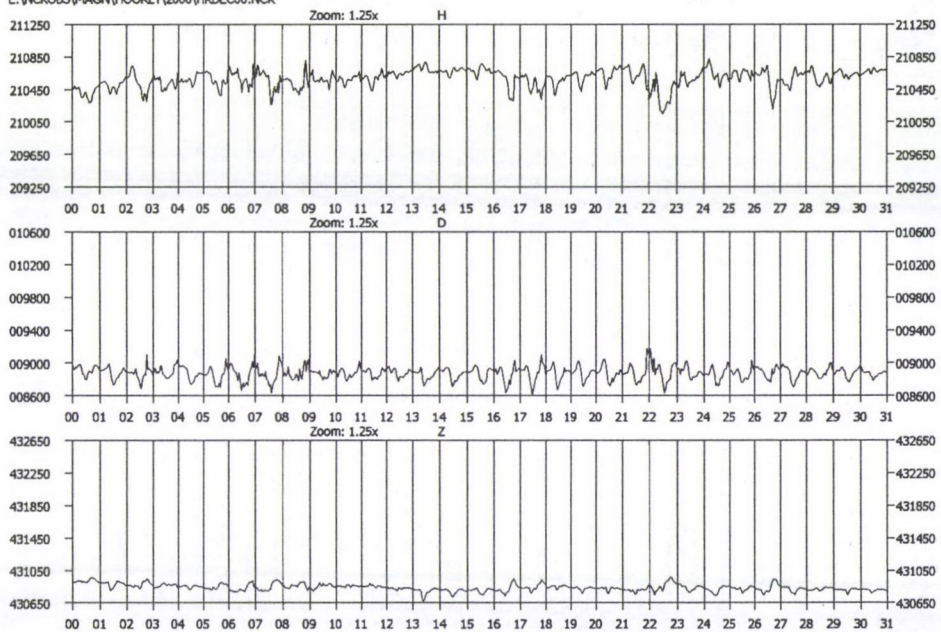
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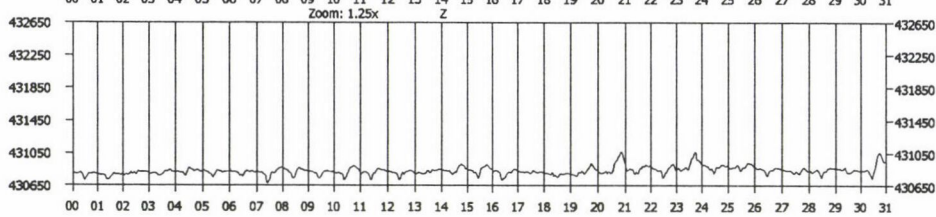
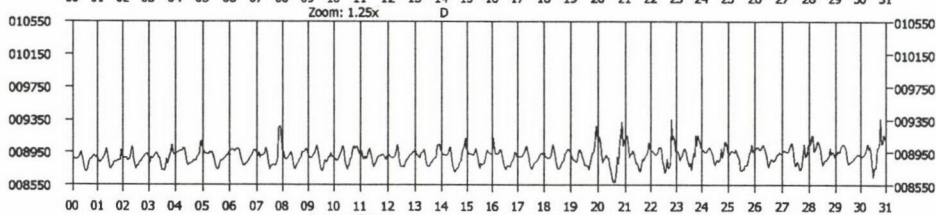
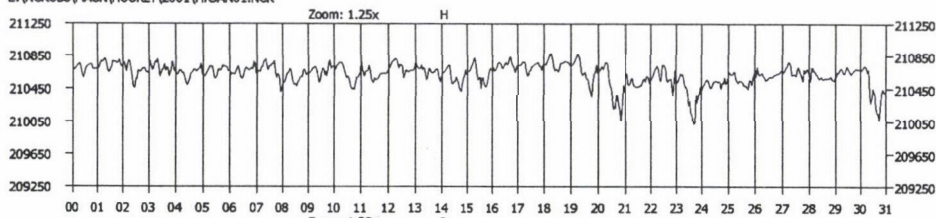
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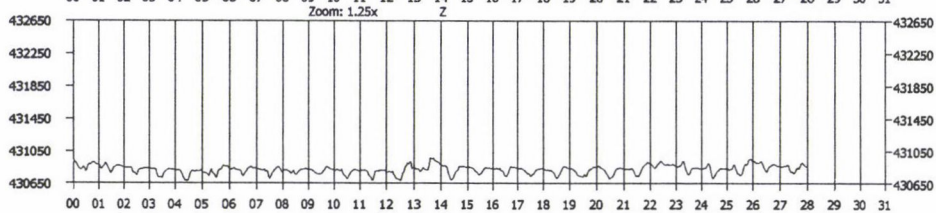
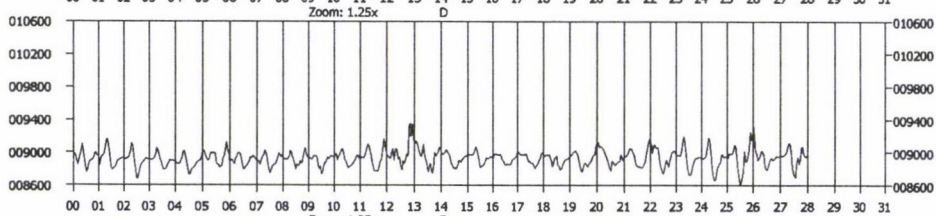
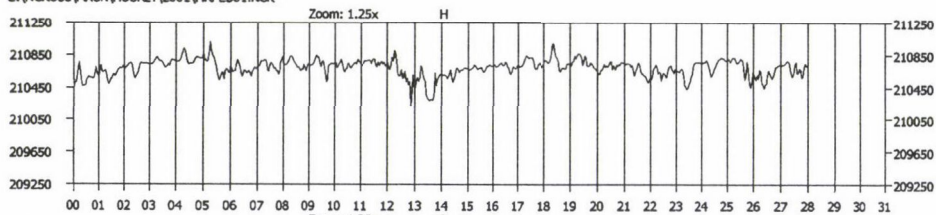
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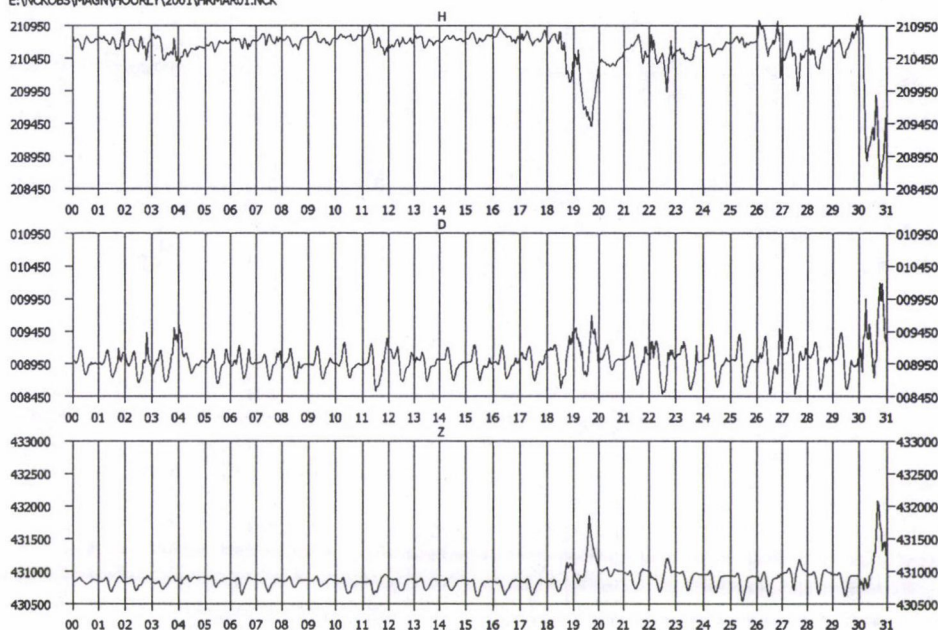
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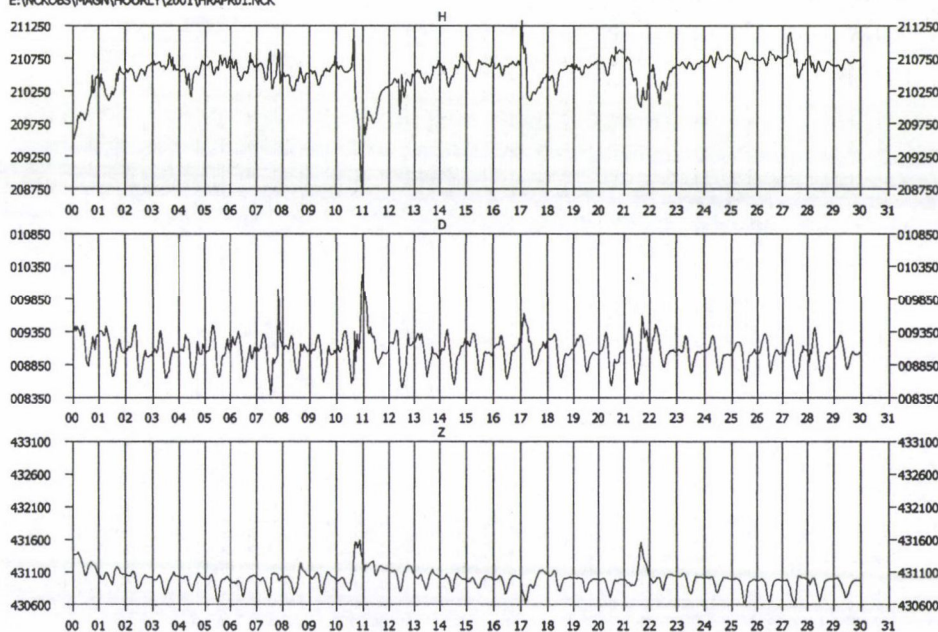
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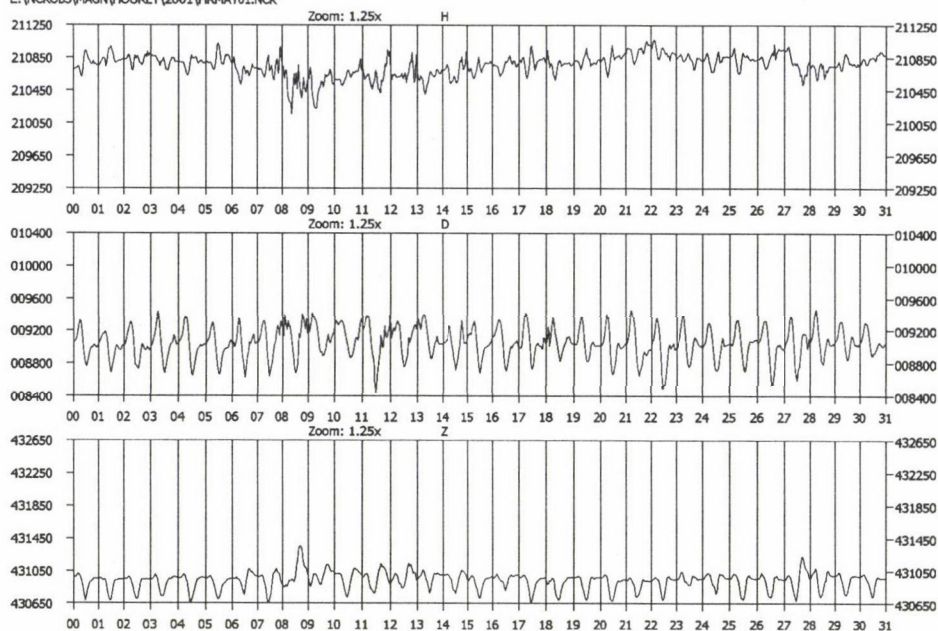
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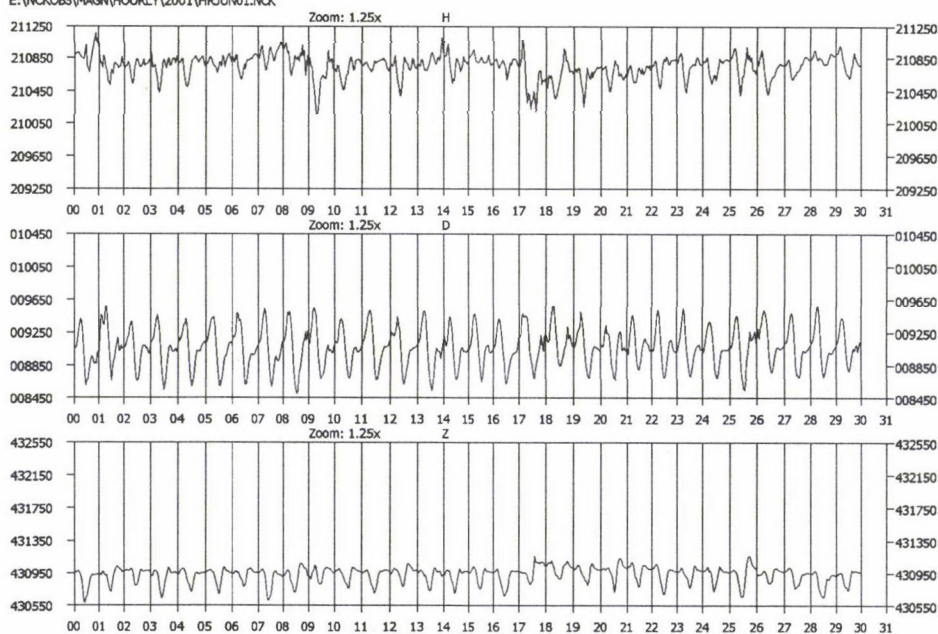
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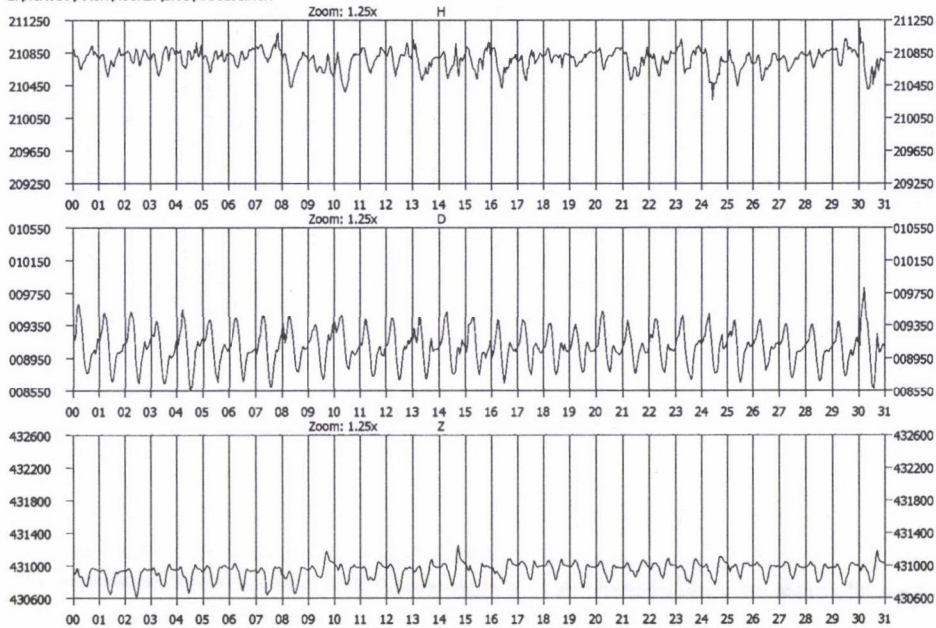
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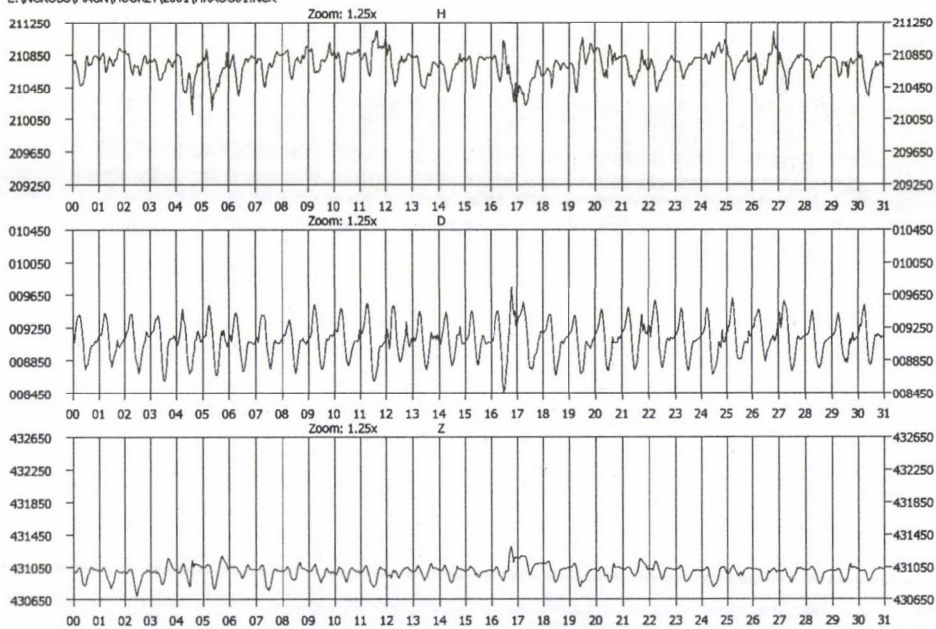
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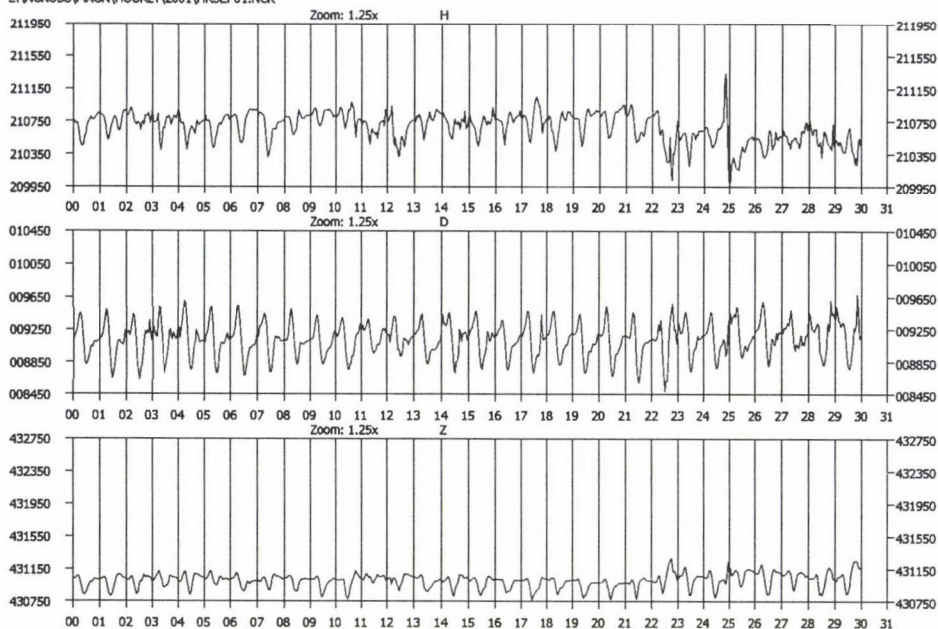
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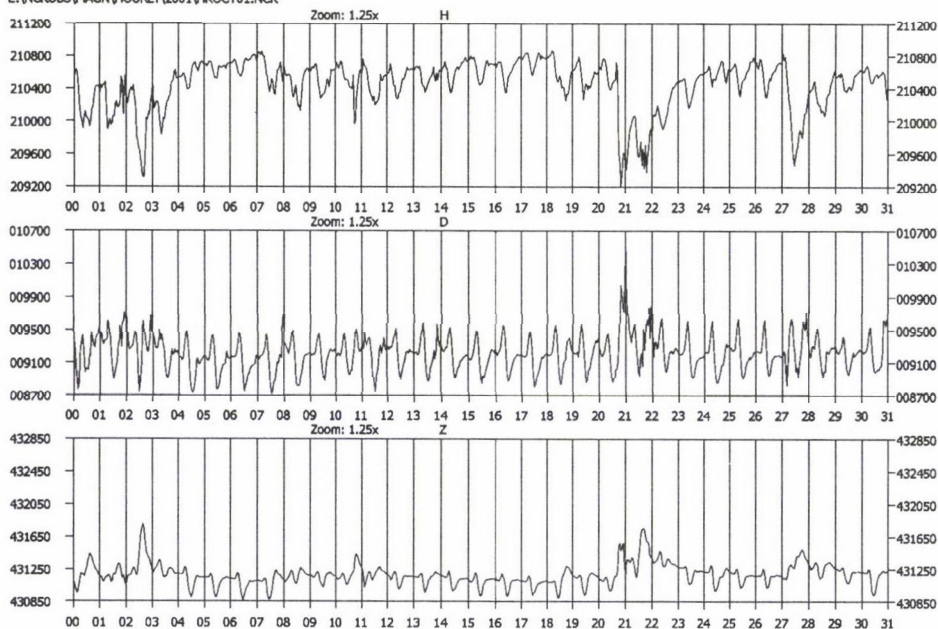
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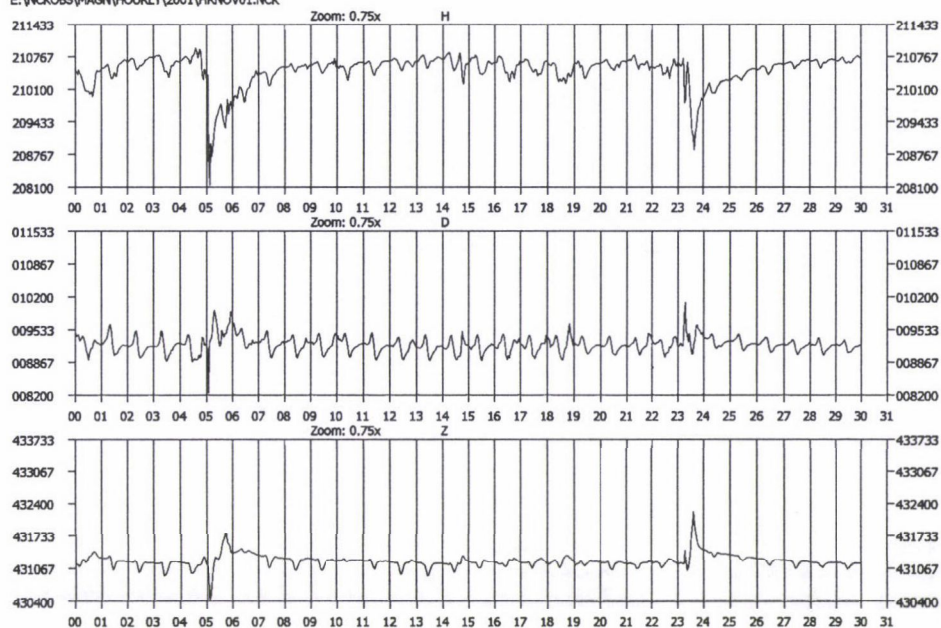
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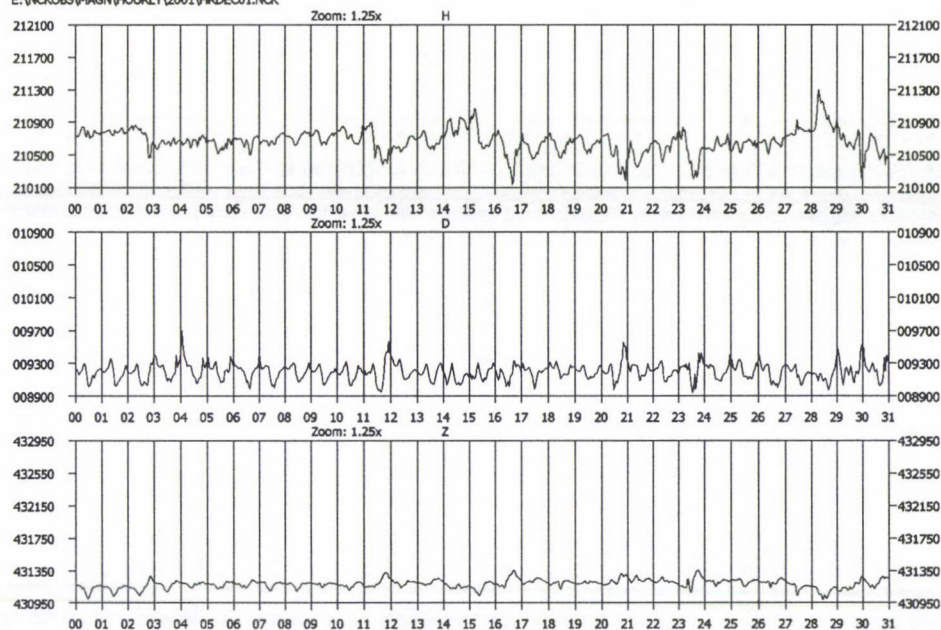
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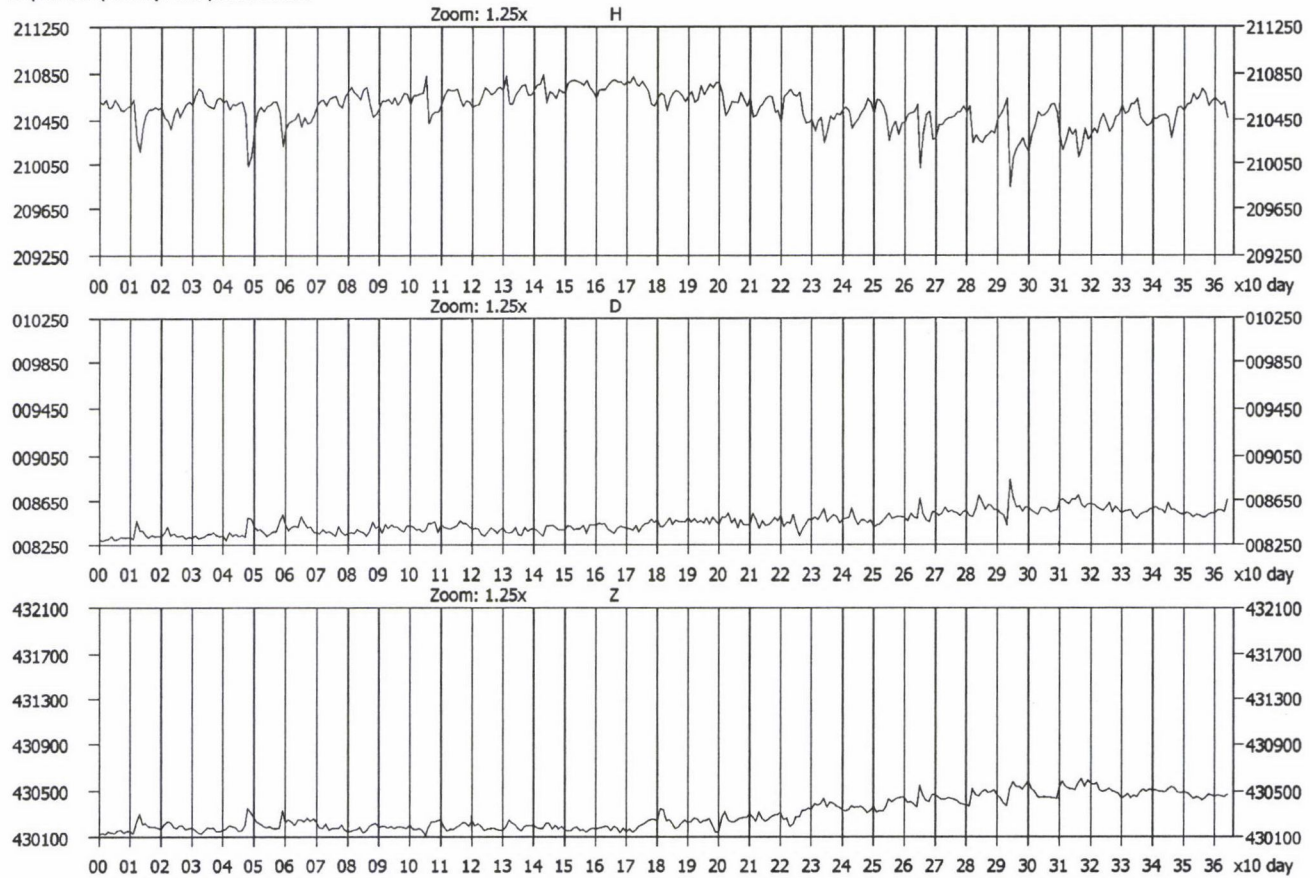


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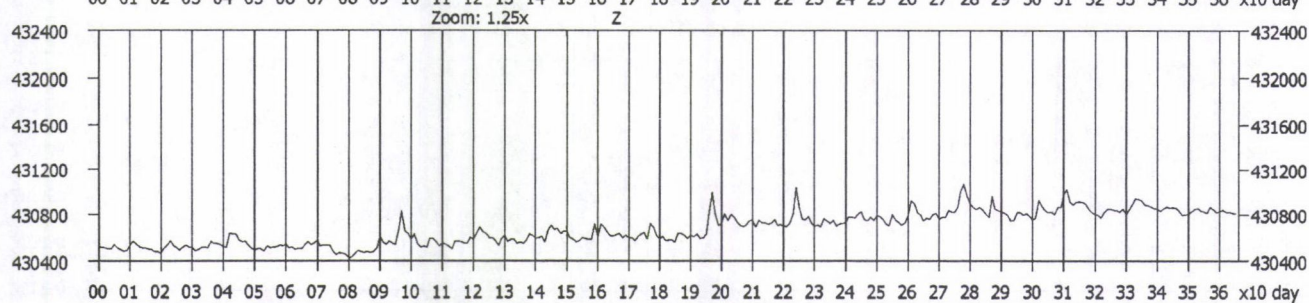
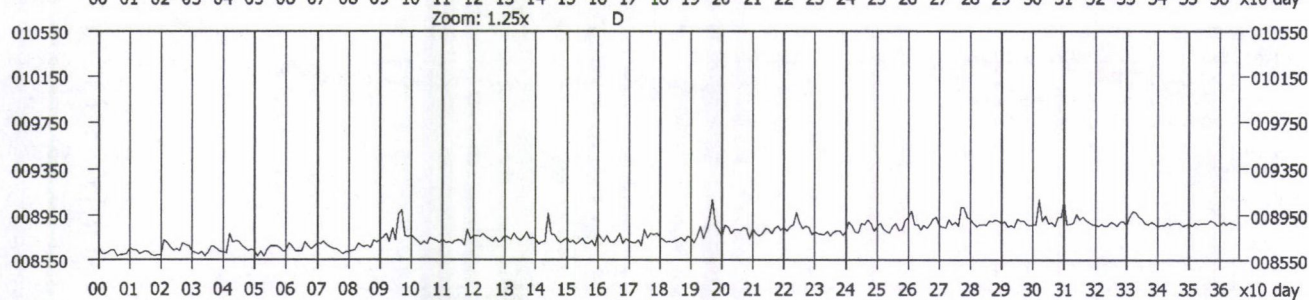
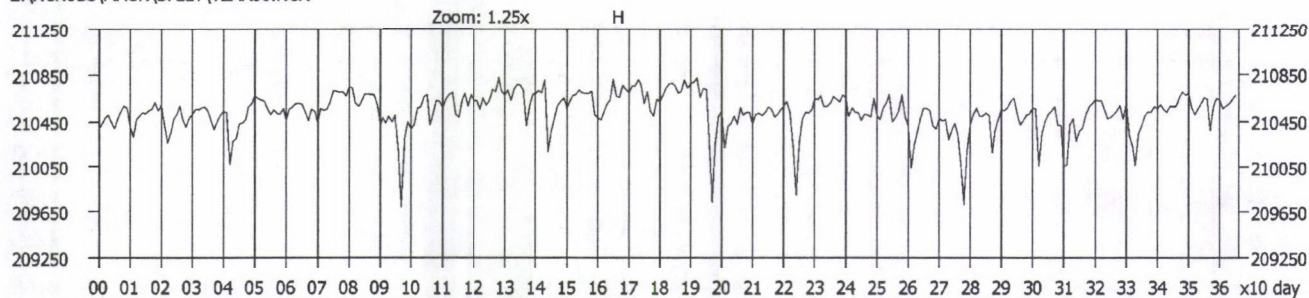
Daily mean values of H , D , Z
1999–2001

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Daily mean values 1999

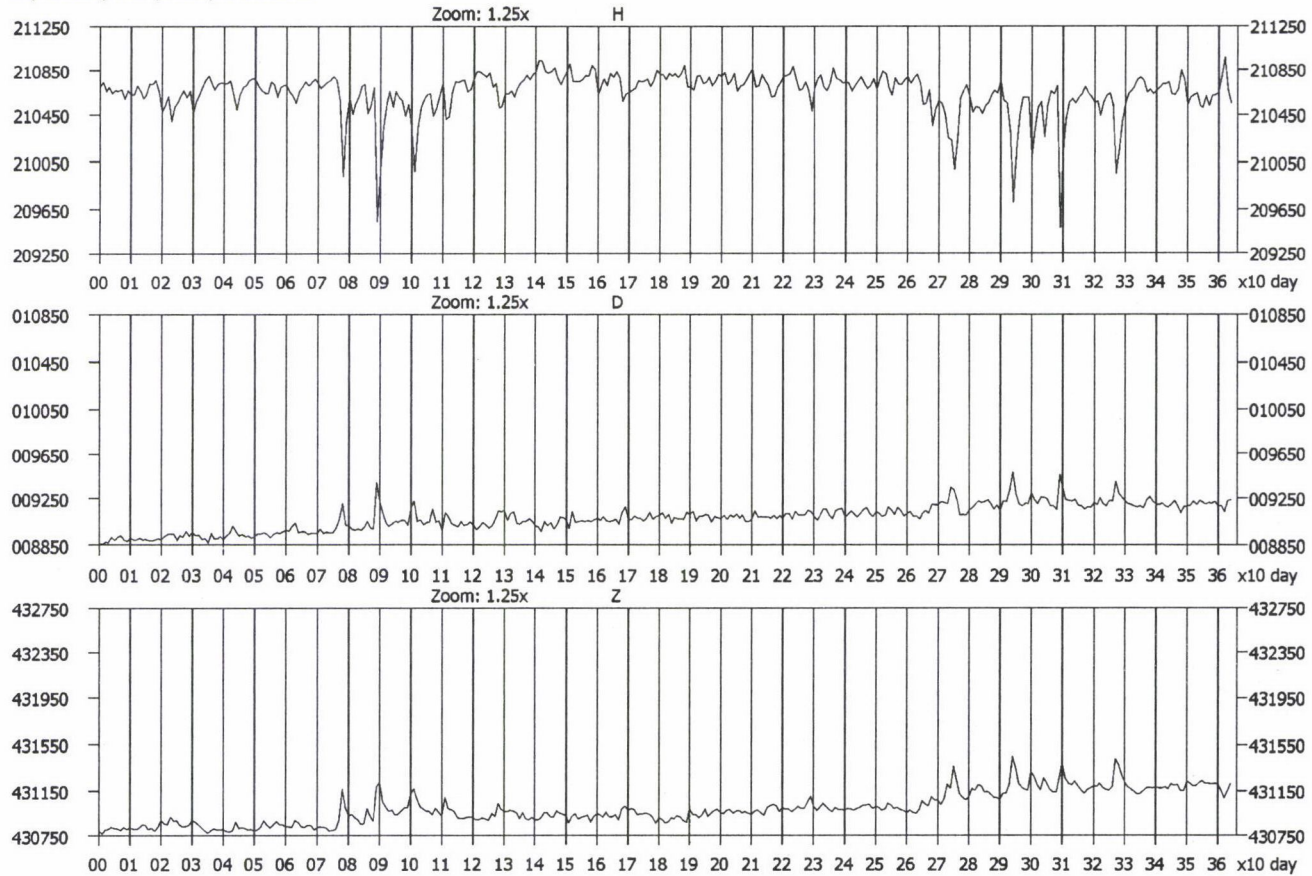
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Daily mean values 2000

DAILY MEAN VALUES 2000

E:\NCKOBS\MAGN\DAI\YEAR01.NCK



Daily mean values 2001

Geomagnetic K indices
1999–2001

Date	K	Sum	Date	K	Sum
990101	01122133	13	990212	43443552	30
990102	21123320	14	990213	22231021	13
990103	21101102	8	990214	10113322	13
990104	11111224	13	990215	53233232	23
990105	32211103	13	990216	11120001	6
990106	31214332	19	990217	01344224	20
990107	11223333	18	990218	55666675	46
990108	32333454	27	990219	63345542	32
990109	43221223	19	990220	00100221	6
990110	21131021	11	990221	00001123	7
990111	21121232	14	990222	21321032	14
990112	11112031	10	990223	12322410	15
990113	11044757	29	990224	10123431	15
990114	21455545	31	990225	03121320	12
990115	43245543	30	990226	00011000	2
990116	23211111	12	990227	10121111	8
990117	21110001	6	990228	00212555	20
990118	00000232	7	990301	55235555	35
990119	20010011	5	990302	53313433	25
990120	21011342	14	990303	12132554	23
990121	12131000	8	990304	23434654	31
990122	11115444	21	990305	43232420	20
990123	12232556	26	990306	23132344	22
990124	33221451	21	990307	33441444	27
990125	41121011	11	990308	23222335	22
990126	20121002	8	990309	33334352	26
990127	13123342	19	990310	66453344	35
990128	01122332	14	990311	43344432	27
990129	12122332	16	990312	12232344	21
990130	21110010	6	990313	10023122	11
990131	02111100	6	990314	30134344	22
990201	00000000	0	990315	34432212	21
990202	01000011	3	990316	00221202	9
990203	21112223	14	990317	20121331	13
990204	21133334	20	990318	10332320	14
990205	43223442	24	990319	10212342	15
990206	22222442	20	990320	10001120	5
990207	31333424	23	990321	10123120	10
990208	11122231	13	990322	00001222	7
990209	11000121	6	990323	11122223	14
990210	10100222	8	990324	10131101	8
990211	42234443	26	990325	00121343	14

Date	K	Sum	Date	K	Sum
990326	12332101	13	990507	22213222	16
990327	11001013	7	990508	12112122	12
990328	21212222	14	990509	21121122	12
990329	32444454	30	990510	32021210	11
990330	42434443	28	990511	00000000	0
990331	22223235	21	990512	02233432	19
990401	34111311	15	990513	35434433	29
990402	13123341	18	990514	31231212	15
990403	21032243	17	990515	22132221	15
990404	31223243	20	990516	11102200	7
990405	22343401	19	990517	01000120	4
990406	34222222	19	990518	55444452	33
990407	42312143	20	990519	32112334	19
990408	00113432	14	990520	22122223	16
990409	22011221	11	990521	31002212	11
990410	11433444	24	990522	01011101	5
990411	23333412	21	990523	21034231	16
990412	41131011	12	990524	13233334	22
990413	00010111	4	990525	43343332	25
990414	11232021	12	990526	21112322	14
990415	10230111	9	990527	21132213	15
990416	21134435	23	990528	11101232	11
990417	56542332	30	990529	12102200	8
990418	22022232	15	990530	00121331	11
990419	12132242	17	990531	11010002	5
990420	33444533	29	990601	00111212	8
990421	21222542	20	990602	31021114	13
990422	21111222	12	990603	31122223	16
990423	12222321	15	990604	23323223	20
990424	32121221	14	990605	30110121	9
990425	00012223	10	990606	02011310	8
990426	20133331	16	990607	12101323	13
990427	01233444	21	990608	23333432	23
990428	32243445	27	990609	33223443	24
990429	33244545	30	990610	22111100	8
990430	43444344	30	990611	00111023	8
990501	43433442	27	990612	21011211	9
990502	21234243	21	990613	11011022	8
990503	33233241	21	990614	11000001	3
990504	11110021	7	990615	00103421	11
990505	10011333	12	990616	11142112	13
990506	22333112	17	990617	23211213	15

Date	K	Sum	Date	K	Sum
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990619	22110211	10	990731	45522255	30
990620	10002110	5	990801	43221200	14
990621	00001100	2	990802	02202332	14
990622	00011202	6	990803	31001123	11
990623	13021213	13	990804	34333312	22
990624	01022111	8	990805	21123223	16
990625	22000101	6	990806	12243534	24
990626	24433354	28	990807	42222133	19
990627	33235554	30	990808	21001134	12
990628	36541122	24	990809	43343311	22
990629	22222331	17	990810	10012333	13
990630	12211010	8	990811	42022233	18
990701	10021232	11	990812	22312123	16
990702	43453445	32	990813	22331133	18
990703	33410302	16	990814	12121221	12
990704	00000010	1	990815	12034554	24
990705	00100122	6	990816	32444544	30
990706	32101433	17	990817	45544442	32
990707	12100222	10	990818	44434544	32
990708	22123222	16	990819	54443433	30
990709	30001111	7	990820	35446544	35
990710	01002230	8	990821	11223010	10
990711	00001112	5	990822	01101445	16
990712	33322132	19	990823	54333445	31
990713	11012221	10	990824	33454533	30
990714	00010233	9	990825	22111234	16
990715	32222332	19	990826	34113534	24
990716	10111212	9	990827	22323342	21
990717	11012210	8	990828	32232432	21
990718	11122222	13	990829	11211323	14
990719	21112212	12	990830	13343444	26
990720	11013322	13	990831	32232356	26
990721	10122542	17	990901	34333243	25
990722	33455443	31	990902	32213242	19
990723	32233332	21	990903	12333212	17
990724	43133233	22	990904	12221232	15
990725	32221133	17	990905	12221122	13
990726	11133322	16	990906	11111221	10
990727	22312110	12	990907	21333345	24
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990729	32101112	11	990909	31224221	17

Date	K	Sum	Date	K	Sum
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990911	33222112	16	991023	44336554	34
990912	23243466	30	991024	54435345	33
990913	55433553	33	991025	42335431	25
990914	53341332	24	991026	11222343	18
990915	33453232	25	991027	24123653	26
990916	25434433	28	991028	21225555	27
990917	32234432	23	991029	22132143	18
990918	12243311	17	991030	12232223	17
990919	21133123	16	991031	21252223	19
990920	22212152	17	991101	22242131	17
990921	21223144	19	991102	22222123	16
990922	22225468	31	991103	30011122	10
990923	45322112	20	991104	22222112	14
990924	12121101	9	991105	11000023	7
990925	00112111	7	991106	31221352	19
990926	10122555	21	991107	33545634	33
990927	44335664	35	991108	32445455	32
990928	43524445	31	991109	44435555	35
990929	53443435	31	991110	44233454	29
990930	44434243	28	991111	34434454	31
991001	22124244	21	991112	22112233	16
991002	23322234	21	991113	54234476	35
991003	22222323	18	991114	32223444	24
991004	23333344	25	991115	20111012	8
991005	23244424	25	991116	12233643	24
991006	12223221	15	991117	22233344	23
991007	11221021	10	991118	23333454	27
991008	22222013	14	991119	22113234	18
991009	11121234	15	991120	32231011	13
991010	24443543	29	991121	22321343	20
991011	52532545	31	991122	42243211	19
991012	54346665	39	991123	23532335	26
991013	42323444	26	991124	32454453	30
991014	34344554	32	991125	22344354	27
991015	44344433	29	991126	11122000	7
991016	33333543	27	991127	00002001	3
991017	32344322	23	991128	22122333	18
991018	11022142	13	991129	22111002	9
991019	31211011	10	991130	22234233	21
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991021	44332345	28	991202	21112132	13

Date	K	Sum
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991204	43354644	33
991205	33443443	28
991206	24334342	25
991207	32233444	25
991208	32232344	23
991209	33232244	23
991210	22122342	18
991211	11223100	10
991212	22011354	18
991213	44533420	25
991214	22000220	8
991215	11000113	7
991216	22221112	13
991217	22222321	16
991218	22111333	16
991219	22112212	13
991220	22210112	11
991221	01110010	4
991222	00001000	1
991223	00002213	8
991224	23432122	19
991225	23324212	19
991226	10000102	4
991227	32110122	12
991228	12122233	16
991229	33220213	16
991230	12221355	21
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Date	K	Sum	Date	K	Sum
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000102	44442543	30	000213	32353544	29
000103	33334352	26	000214	34456766	41
000104	32234345	26	000215	54333265	31
000105	54443455	34	000216	32223443	23
000106	34256645	35	000217	01243241	17
000107	53132343	24	000218	00111000	3
000108	20122300	10	000219	00131121	9
000109	11000003	5	000220	10121015	11
000110	21101325	15	000221	45333543	30
000111	43234466	32	000222	23113223	17
000112	53342141	23	000223	20155522	22
000113	22132322	17	000224	35555566	40
000114	42101332	16	000225	45344434	31
000115	22121122	13	000226	43343554	31
000116	12123242	17	000227	43344333	27
000117	00110010	3	000228	35455322	29
000118	00110210	5	000229	11343211	16
000119	00100134	9	000301	23544445	31
000120	21232362	21	000302	44323214	23
000121	20010000	3	000303	10122152	14
000122	23234676	33	000304	00103212	19
000123	66354422	32	000305	12112324	16
000124	12544345	28	000306	23444335	28
000125	13221231	15	000307	44344345	31
000126	22231224	18	000308	33344452	28
000127	43334365	31	000309	31101021	9
000128	54455456	38	000310	10323325	19
000129	64446665	41	000311	52225233	24
000130	33334454	29	000312	35555443	34
000131	42232433	23	000313	31100033	11
000201	22114343	21	000314	31012243	16
000202	21132523	19	000315	20010020	5
000203	11214434	20	000316	00001212	6
000204	22312113	15	000317	31333100	14
000205	11020366	19	000318	10133242	16
000206	55464476	41	000319	12223331	17
000207	54446665	40	000320	10243101	12
000208	44343565	34	000321	10422210	12
000209	23333532	24	000322	32324344	25
000210	33423244	25	000323	23335422	24
000211	35333356	31	000324	21333322	19

Date	K	Sum	Date	K	Sum
000325	32321440	19	000506	43223334	24
000326	10121313	12	000507	12222132	15
000327	11212100	8	000508	10122221	11
000328	22120000	7	000509	12132324	18
000329	00122155	16	000510	21111132	12
000330	42113354	23	000511	11102112	9
000331	45334344	30	000512	24332245	25
000401	33233455	28	000513	52334443	28
000402	54433135	28	000514	52122241	19
000403	22123324	19	000515	54322323	24
000404	54403354	28	000516	35444345	32
000405	44100112	13	000517	76442243	32
000406	02011788	27	000518	52122111	15
000407	85635545	41	000519	33223222	19
000408	21333134	20	000520	11111122	10
000409	32224454	26	000521	12221122	13
000410	23223344	23	000522	03233233	19
000411	12333142	19	000523	23324576	32
000412	21102222	12	000524	88665566	50
000413	24111100	10	000525	55544455	37
000414	00110020	4	000526	44343551	29
000415	11122344	18	000527	32323423	22
000416	45434232	27	000528	13232444	23
000417	43331212	19	000529	33335555	32
000418	01001142	9	000530	43434545	32
000419	45223422	24	000531	34322222	20
000420	34434433	28	000601	43212213	18
000421	32144322	21	000602	22311123	15
000422	12223122	15	000603	33344231	23
000423	10221212	11	000604	13201554	21
000424	14445432	27	000605	55535455	37
000425	01132231	13	000606	44335622	29
000426	00101021	5	000607	22253346	27
000427	41233445	26	000608	25467766	43
000428	53332233	24	000609	12241102	13
000429	23133325	22	000610	35354423	29
000430	34212353	23	000611	34355652	33
000501	25233444	27	000612	34424435	29
000502	52255544	32	000613	13324323	21
000503	33322555	28	000614	43335666	36
000504	12232233	18	000615	74335552	34
000505	22333224	21	000616	21112212	12

Date	K	Sum	Date	K	Sum
000617	22103223	15	000729	53465433	33
000618	10022243	14	000730	24112232	17
000619	41010321	12	000731	22323456	27
000620	22133011	13	000801	20012444	17
000621	10012224	12	000802	43222333	22
000622	43243334	26	000803	22232332	19
000623	35216564	32	000804	42432454	28
000624	55521102	21	000805	34444524	30
000625	21100123	10	000806	24234324	24
000626	34565565	39	000807	22233223	19
000627	44425335	30	000808	22313232	18
000628	43222234	22	000809	21001213	10
000629	43232212	19	000810	22544346	30
000630	10011031	7	000811	65445256	37
000701	41212243	19	000812	47666674	46
000702	13111312	13	000813	56423223	27
000703	23234344	25	000814	11013345	18
000704	32125432	22	000815	34122222	18
000705	24674211	27	000816	22312223	17
000706	12103231	13	000817	11112121	10
000707	21021122	11	000818	22001012	8
000708	21022321	13	000819	10211321	11
000709	12233223	18	000820	00032231	11
000710	12445553	28	000821	33221226	22
000711	46557656	44	000822	12101001	6
000712	43130233	19	000823	10123522	16
000713	24267644	35	000824	33222221	17
000714	32344765	34	000825	00111121	7
000715	33448999	49	000826	22212112	13
000716	76565422	37	000827	21113233	16
000717	44335211	21	000828	32334775	34
000718	13224444	24	000829	66453765	42
000719	22112544	21	000830	33333224	23
000720	57544333	34	000831	32344334	26
000721	31112112	12	000901	32333353	25
000722	12233443	22	000902	44445513	30
000723	22134564	27	000903	12121244	17
000724	32110112	11	000904	22324575	30
000725	12122213	14	000905	32221345	22
000726	12333356	26	000906	21203555	23
000727	31012213	13	000907	43243354	28
000728	33466652	35	000908	31344545	29

Date	K	Sum	Date	K	Sum
000909	22223310	15	001021	00211010	5
000910	00130131	9	001022	10344653	26
000911	00023312	11	001023	43343233	25
000912	23235254	26	001024	32333133	21
000913	54212323	22	001025	01233123	15
000914	11001022	7	001026	31333232	20
000915	13121246	20	001027	30121203	12
000916	43233457	31	001028	01253345	23
000917	53235569	38	001029	66353454	36
000918	85566654	45	001030	63443322	27
000919	44356645	37	001031	52232535	27
000920	53134232	23	001101	32211113	14
000921	22343232	21	001102	31101000	6
000922	33322121	17	001103	00111044	11
000923	32222211	15	001104	45544656	39
000924	12111464	20	001105	53313455	29
000925	32334656	32	001106	34466688	45
000926	55445344	34	001107	66543353	35
000927	32323324	22	001108	25564333	31
000928	24144422	23	001109	32212445	23
000929	32131242	18	001110	34664333	32
000930	44456666	41	001111	23125663	28
001001	54432331	25	001112	33454534	31
001002	01233554	23	001113	23143244	23
001003	54345513	30	001114	23111023	13
001004	32556776	41	001115	12111030	9
001005	66866886	54	001116	00101014	7
001006	21101012	8	001117	10000100	2
001007	01112330	11	001118	00012253	13
001008	00000003	3	001119	12321223	16
001009	10011134	11	001120	21222431	17
001010	22222403	17	001121	42223343	23
001011	55233052	25	001122	32042311	16
001012	31022204	14	001123	23121221	14
001013	77524442	35	001124	12242455	25
001014	45566656	43	001125	32121043	16
001015	33223223	20	001126	12434576	32
001016	52233433	25	001127	66555363	39
001017	43332243	24	001128	34556664	39
001018	32234224	22	001129	76756535	44
001019	32234212	19	001130	12221214	15
001020	01111111	7	001201	11122300	10

Date	K	Sum
001202	01112212	10
001203	12323363	23
001204	43311034	19
001205	22133200	13
001206	11222545	22
001207	33334246	28
001208	44445545	35
001209	44533555	34
001210	43322233	22
001211	23232134	20
001212	12122232	15
001213	31021012	10
001214	00121112	8
001215	10021100	5
001216	00002222	8
001217	32124351	21
001218	22231332	18
001219	32232121	16
001220	00120021	6
001221	01022112	9
001222	01100125	10
001223	55333233	27
001224	12111122	11
001225	31123403	17
001226	21011144	14
001227	21212541	18
001228	22224121	16
001229	14110222	13
001230	21222101	11
001231	20121000	6

Date	K	Sum	Date	K	Sum
010101	00110111	5	010212	20112223	13
010102	10002113	8	010213	34434455	32
010103	22223122	16	010214	33233443	25
010104	31233333	21	010215	11231211	12
010105	21010024	10	010216	01122223	13
010106	21110202	9	010217	20010211	7
010107	21221113	13	010218	10011112	7
010108	22121254	19	010219	10222121	11
010109	21122122	13	010220	22222122	15
010110	01012323	12	010221	12122212	13
010111	20122232	14	010222	10222222	13
010112	32121101	11	010223	22222222	16
010113	11122112	11	010224	11122100	8
010114	22221142	16	010225	00110021	5
010115	11111223	12	010226	30211523	17
010116	11123221	13	010227	43332111	18
010117	32111322	15	010228	10235332	19
010118	10232123	14	010301	32311222	16
010119	12101022	9	010302	21122343	18
010120	10222234	16	010303	22233453	24
010121	22232454	24	010304	33322464	27
010122	33232323	21	010305	45322222	22
010123	22143365	26	010306	21222241	16
010124	22133463	24	010307	22222422	18
010125	22110332	14	010308	21132234	18
010126	22222233	18	010309	22133221	16
010127	31111010	8	010310	12221131	13
010128	01223243	17	010311	22211011	10
010129	44221123	19	010312	00123334	16
010130	22111100	8	010313	32232222	18
010131	01433553	24	010314	31221022	13
010201	23122132	16	010315	10101121	7
010202	32010112	10	010316	00011112	6
010203	00100000	1	010317	00021232	10
010204	00001010	2	010318	32212014	15
010205	00011023	7	010319	21233565	27
010206	33322232	20	010320	44445533	32
010207	22211121	12	010321	43221102	15
010208	02220124	13	010322	11223543	21
010209	10112222	11	010323	54333553	31
010210	11122320	12	010324	23323341	21
010211	21222012	12	010325	12222121	13

Date	K	Sum	Date	K	Sum
010326	01102022	8	010507	22212121	13
010327	42132456	27	010508	10132344	18
010328	32456633	32	010509	44344553	32
010329	33453433	28	010510	42322232	20
010330	32233344	24	010511	21110123	11
010331	77755767	51	010512	32134555	28
010401	54413344	28	010513	53323454	29
010402	52233442	25	010514	33311221	16
010403	21211212	12	010515	11111343	15
010404	22115553	24	010516	12221213	14
010405	11443433	23	010517	11111223	12
010406	11222224	16	010518	33122123	17
010407	34221442	22	010519	34211120	14
010408	22346576	35	010520	11112111	9
010409	22332433	22	010521	10021111	7
010410	32122323	18	010522	11122243	16
010411	10113757	25	010523	22112332	16
010412	65443201	25	010524	22010011	7
010413	11365554	30	010525	11111211	9
010414	33233322	21	010526	12221101	10
010415	13215232	19	010527	01113522	15
010416	32111203	13	010528	22233534	24
010417	10111213	10	010529	31113321	15
010418	66521122	25	010530	00011021	5
010419	11121002	8	010531	00000111	3
010420	22011102	9	010601	00034334	17
010421	11010423	12	010602	54353223	27
010422	42334644	30	010603	12212112	12
010423	43222111	16	010604	31221212	14
010424	11111011	7	010605	22111111	10
010425	10122122	11	010606	11123232	15
010426	11213122	13	010607	23131222	16
010427	10111111	7	010608	12231223	16
010428	26435543	32	010609	13243345	25
010429	43213321	19	010610	53322332	23
010430	10000010	2	010611	21022221	12
010501	10011011	5	010612	11101111	7
010502	11221211	11	010613	22111221	12
010503	11022222	12	010614	31101114	12
010504	11221121	11	010615	23131021	13
010505	01000011	3	010616	21200121	9
010506	01111012	7	010617	01113321	12

Date	K	Sum	Date	K	Sum
010618	34445444	32	010730	11011233	12
010619	41111344	19	010731	44434523	29
010620	23322311	17	010801	42123222	18
010621	13212332	17	010802	21222311	14
010622	21011211	9	010803	22422322	19
010623	12102211	10	010804	11122322	14
010624	21122322	15	010805	22235533	25
010625	12101211	9	010806	23233334	23
010626	11132343	18	010807	32222221	16
010627	32100101	8	010808	21122121	12
010628	00010011	3	010809	02112223	13
010629	00111111	6	010810	32222022	15
010630	12122022	12	010811	21000013	7
010701	31011223	13	010812	11142433	19
010702	11011121	8	010813	35343343	28
010703	02122221	12	010814	22233223	19
010704	12021312	12	010815	11011132	10
010705	23233333	22	010816	10010001	3
010706	12122322	15	010817	00045566	26
010707	11011221	9	010818	22314434	23
010708	23221345	22	010819	02342221	16
010709	42102222	15	010820	01123223	14
010710	01122242	14	010821	12132333	18
010711	33021120	12	010822	11233344	21
010712	22122222	15	010823	31112121	12
010713	22120033	13	010824	01011000	3
010714	54233211	21	010825	01023243	15
010715	01103342	14	010826	32231233	19
010716	32032424	20	010827	13122243	18
010717	43234322	23	010828	33212211	15
010718	22222311	15	010829	01121111	8
010719	11132321	14	010830	01122431	14
010720	11011200	6	010831	21132422	17
010721	11011012	7	010901	21101100	6
010722	21212133	15	010902	00012102	6
010723	32123232	18	010903	21223324	19
010724	31123332	18	010904	33231232	19
010725	13343432	23	010905	21012210	9
010726	33112121	14	010906	20010021	6
010727	01112222	11	010907	00001113	6
010728	01001000	2	010908	31011120	9
010729	01111211	8	010909	10121100	6

Date	K	Sum	Date	K	Sum
010910	11000111	5	011022	63264657	39
010911	01013343	15	011023	53411110	16
010912	22322234	20	011024	11000000	2
010913	24332121	18	011025	00421111	10
010914	31112113	13	011026	00111122	8
010915	42344442	27	011027	22012111	10
010916	31002332	14	011028	25335334	28
010917	01311113	11	011029	31133423	20
010918	21112452	18	011030	12121202	11
010919	33012121	13	011031	00103253	14
010920	00111002	5	011101	53323320	21
010921	10101112	7	011102	00213001	7
010922	20133210	12	011103	10001000	2
010923	01344654	27	011104	00112110	6
010924	42122221	16	011105	00133455	21
010925	00111157	16	011106	76324666	40
010926	52442222	23	011107	43121232	18
010927	12132343	19	011108	21111001	7
010928	31322332	19	011109	10111122	9
010929	23243455	28	011110	11111114	11
010930	41124566	29	011111	21120010	7
011001	55453434	33	011112	10011000	3
011002	33422356	28	011113	01010312	8
011003	52446545	35	011114	11211011	8
011004	41332431	21	011115	00012441	12
011005	00121332	12	011116	21111100	7
011006	11232021	12	011117	12223233	18
011007	00012002	5	011118	22122223	16
011008	22334425	25	011119	32233444	25
011009	42342311	20	011120	32310000	9
011010	11122231	13	011121	10011200	5
011011	32101653	21	011122	11121133	13
011012	55333443	30	011123	22223333	20
011013	32231210	14	011124	23655313	28
011014	11223353	20	011125	11232101	11
011015	32121212	14	011126	11210000	5
011016	21122121	12	011127	00010100	2
011017	10201001	5	011128	00000001	1
011018	10012121	8	011129	10011000	3
011019	01112331	12	011130	00000010	1
011020	02132221	13	011201	00133322	14
011021	22011676	25	011202	10222211	11

Date	K	Sum
011203	01123133	14
011204	32233242	21
011205	42121232	17
011206	32132333	20
011207	21113311	13
011208	31111211	11
011209	01020012	6
011210	00111012	6
011211	01211022	9
011212	11122344	18
011213	10001100	3
011214	00011222	8
011215	22233112	16
011216	23322112	16
011217	23122331	17
011218	41221202	14
011219	21021222	12
011220	00011012	5
011221	01211344	16
011222	23121020	11
011223	10131202	10
011224	13443443	26
011225	22231204	16
011226	10111022	8
011227	21012231	12
011228	00223202	11
011229	14332223	20
011230	33222345	24
011231	23211344	20

Special phenomena

SSC-s 1999–2001

Date	CET	Ampl.	Hx	Hy	Hz	Remark
	(UT+1h)	in H(nT)				
990113	0900	11	+	–	–	–
990122	1409	6	+	–	–	–
990211	1217	12	+	–	–	–
990217	0805	14	+	–	–	–
990218	0341	31	+	–	+	–
990310	0228	15	+	–	+	–
990416	1225	22	+	–	+	–
990505	1643	24	+	–	+	–
990518	0156	35	+	–	+	–
990615	1408	16	+	–	+	–
990626	0419	18	+	–	+	–
990626	2116	54	+	–	–	–
990628	0611	73	+	–	+	in storm
990702	0156	24	+	–	+	–
990706	1608	33	+	–	+	–
990712	0316	10	+	–	+	–
990722	0347	6	+	–	+	–
990804	0319	21	+	–	+	–
990815	1143	25	+	–	+	–
990816	0741	8	+	–	+	–
990909	1356	31	+	–	+	–
990912	0458	15	+	–	+	–
990915	2117	28	+	–	–	–
990922	1322	36	+	–	+	–
991021	0327	9	+	–	–	–
991212	1651	9	+	+	–	sign in Hy unusual
000127	1552	22	+	–	–	–
000205	1643	9	+	–	+	–
000211	0358	15	+	–	+	–
000212	0050	75	+	–	–	–

Date	CET (UT+1h)	Ampl. in H(nT)	Hx	Hy	Hz	Remark
000220	2238	37	+	-	+	-
000323	2023	17	+	-	+	-
000406	1735	111	+	-	+	-
000523	1524	66	+	-	+	-
000523	1758	24	+	-	+	-
000604	1601	36	+	-	+	-
000605	2255	19	+	-	+	-
000608	1010	15	+	+	-	sign in Hy unusual
000623	1402	45	+	-	+	-
000710	1356	27	+	-	+	-
000713	1041	30	+	-	-	-
000714	1629	63	+	-	+	-
000715	1536	205	+	-	+	-
000719	1627	63	+	-	+	-
000726	1954	40	+	-	-	-
000810	0558	6	+	-	-	-
000814	2258	28	+	-	+	-
000904	1430	16	+	-	+	-
000906	1758	44	+	-	+	-
000915	2012	18	+	-	+	-
000917	1722	58	+	-	+	-
000918	1540	68	+	-	+	-
001003	0153	25	+	-	+	-
001012	2326	275	+	-	+	-
001028	1052	33	+	-	-	-
001104	0322	15	+	-	+	-
001108	0437	12	+	-	-	-
001126	1540	26	+	-	+	-
001128	0625	17	+	-	-	-
010117	1730	16	+	-	+	-
010118	2352	6	+	-	+	-

Date	CET	Ampl.	Hx	Hy	H _z	Remark
	(UT+1h)	in H(nT)				
010123	1147	31	+	-	+	-
010131	0902	24	+	-	+	-
010303	1219	15	+	-	+	-
010322	1438	26	+	-	+	-
010327	1840	30	+	-	+	-
010331	0148	214	+	-	-	-
010404	1549	65	+	-	+	-
010408	1201	19	+	-	+	-
010411	1616	46	+	-	+	-
010413	0836	10	+	-	+	-
010418	0143	67	+	-	+	-
010421	1700	32	+	-	+	-
010428	0600	51	+	-	+	-
010527	1557	46	+	-	+	-
010618	0359	19	+	-	+	-
010812	1234	53	+	-	+	-
010817	1203	32	+	-	+	-
010825	1158	10	+	-	+	-
010827	2049	46	+	-	-	-
010914	0305	27	+	-	+	-
010925	2117	90	+	-	-	-
010929	1039	13	+	-	-	-
011011	1758	45	+	-	+	-
011021	1748	73	+	-	-	-
011028	0417	10	+	-	+	-
011031	1447	19	+	-	+	-
011106	0253	107	+	-	+	-
011115	1608	19	+	-	-	-
011124	0655	61	+	-	+	-
011229	0636	38	+	-	-	-
011230	2108	42	+	-	+	-

Special phenomena
sfe 1999-2001

Date	Beginning	Maximum	End	Ampl.	Sign		
	GMT	GMT	GMT	nT	Hx	Hy	Hz
990223	0745	0751	0756	21	-	+	-
990312	0258	0308	0314	18	-	+	-
990319	0741	0751	0853	9	-	+	-
990530	1046	1050	1058	10	-	+	-
990906	1610	1616	1623	8	-	+	-
991014	0855	0902	0908	21	-	+	-
991104	0108	0115	0124	14	-	+	-
991118	0948	0952	0957	17	-	+	-
991127	1209	1213	1220	14	-	-	+
991130	1226	1234	1245	25	-	+	-
000204	0745	0751	0755	12	-	+	-
000317	0116	0123	0133	11	-	+	-
000317	0648	0652	0656	9	-	+	-
000501	1508	1511	1516	23	-	+	-
000508	1427	1433	1440	7	-	+	-
000603	0947	0951	1005	9	-	+	+
000820	1526	1531	1539	10	-	+	+
001219	1207	1213	1218	5	-	+	-
010110	1014	1017	1022	7	-	+	-
010125	0412	0418	0423	11	-	+	-
010125	0506	0510	0515	10	-	+	-
010224	1014	1018	1027	6	-	+	0
010415	1344	1350	1359	70	-	-	+
010506	0643	0649	0655	8	-	+	-
010611	1402	1405	1408	12	-	-	-
011019	0938	0943	0950	8	-	+	-
011026	1026	1030	1036	11	-	+	-
011127	0856	0906	0911	7	-	+	-
011203	1023	1031	1041	12	-	+	-
011213	1424	1430	1438	8	-	-	+

Annual mean values of geomagnetic elements

Year	D	H nT	Z nT	I	X nT	Y nT	F nT
1961	-0°23.6'	20816	42077	63°40.7'	20816	-143	46944
1962	-0°19.6'	20827	42093	63°40.5'	20827	-119	46964
1963	-0°14.3'	20839	42116	63°40.4'	20839	-87	46990
1964	-0°10.5'	20845	42126	63°40.4'	20845	-64	47001
1965	-0°08.1'	20877	42137	63°38.6'	20877	-49	47025
1966	-0°06.8'	20888	42156	63°38.5'	20888	-41	47047
1967	-0°06.0'	20903	42179	63°38.3'	20903	-36	47074
1968	-0°03.0'	20921	42196	63°37.7'	20921	-18	47098
1969	0°00.2'	20942	42214	63°36.9'	20942	1	47123
1970	0°02.8'	20964	42235	63°36.1'	20964	17	47152
1971	0°04.3'	20992	42262	63°35.2'	20992	26	47188
1972	0°06.5'	21011	42286	63°34.7'	21011	40	47218
1973	0°10.2'	21028	42317	63°34.6'	21028	62	47254
1974	0°13.6'	21046	42350	63°34.5'	21046	83	47291
1975	0°18.5'	21072	42380	63°33.8'	21072	113	47330
1976	0°23.8'	21084	42413	63°34.0'	21084	146	47365
1977	0°28.8'	21106	42443*	63°33.6*	21105	177	47401*
1978	0°34.6'	21108	42473*	63°34.4*	21107	212	47429*
1979	0°41.4'	21113*	42496*	63°34.8*	21112*	254	47452*
1980	0°46.3'	21107*	42512*	63°35.8*	21105*	284	47463*
1981	0°52.4'	21097*	42530*	63°37.0*	21095*	322	47475*
1982	0°57.5'	21078	42549	63°38.8'	21075	353	47484
1983	1°02.7'	21078	42581	63°39.8'	21074	384	47512
1984	1°08.1'	21075	42601	63°40.7'	21071	417	47529
1985	1°12.7'	21073	42625	63°41.7'	21068	446	47550
1986	1°17.8'	21065	42660	63°43.1'	21060	477	47577
1987	1°21.9'	21067	42689	63°44.0'	21061	502	47604
1988	1°26.6'	21052	42723	63°46.0'	21045	530	47628
1989	1°31.3'	21041	42761	63°48.0'	21034	559	47657
1990	1°35.5'	21044	42782	63°48.3'	21036	584	47678
1991	1°36.3'	21027	42816	63°50.4'	21019	589	47701
1992	1°38.1'	21037	42834	63°50.4'	21028	600	47721
1993	1°43.2'	21039	42853	63°51.0'	21030	631	47739
1994	1°48.4'	21037	42877	63°52.0'	21026	663	47760
1995	1°56.6'	21052	42898	63°51.7'	21039	713	47785
1996	2°02.0'	21062	42920	63°51.7'	21048	747	47809
1997	2°07.5'	21060	42955	63°52.9'	21045	781	47839
1998	2°13.7'	21053	42997	63°54.7'	21037	819	47875
1999	2°18.3'	21055	43030	63°55.6'	21038	847	47905
2000	2°23.7'	21054	43068	63°56.9'	21035	880	47938
2001	2°28.4'	21064	43099	63°57.2'	21045	909	47972

III. ATMOSPHERIC ELECTRICITY AND THE IONOSPHERE

ATMOSPHERIC ELECTRICITY DATA

Hourly means of the potential gradient

Atmospheric electricity data have been published since 1962. This table contains the hourly average values of the potential gradient expressed in V/m. The date column gives year, month, day (e.g. 990101 indicates 1999 January 1). Hourly averages have been taken only from hours having a recording period of 30 minutes or more. If values were available only for part of an hour the average is entered in square brackets []. These data have been used in the determination of the daily means. Values uncertain for some reason are entered in round brackets () and have not been used in calculating daily means. Daily means of each day with 24 hours of recording are entered. However, loss of a maximum of one hour's data out of twelve (for example, on account of instrument maintenance or calibration) has not precluded entering this mean value. In hours marked by S the value of the potential gradient exceeded permanently or several times the measuring limits of the equipment making the determination of an hourly average impossible. The direction of the deviations is marked by signs. OBS indicates that the potential gradient exceeded the measuring limits of the equipment both in positive and negative directions. Gaps of some days are generally due to missing records. Data are presented in universal time (GMT).

Hourly means of quantities of positive and negative charges transported by point-discharge for each month

In this table the values are expressed in 10^{-6} Asec/hour. Data are presented in universal time (GMT).

Both the equipments and methods of measurements of potential gradient and point discharge have been described in the paper by BENCZE P and MÄRCZ F: "Atmosphärisch-elektrische und ionosphärische Messungen im Observatorium bei Nagycenk". Observatoriumsberichte des Geophysikalischen Forschungslaboratoriums der Ungarischen Akademie der Wissenschaften vom Jahre 1966, Sopron, 1967. Further information is given by BENCZE P and MÄRCZ F: "The Geophysical Observatory near Nagycenk. II. Atmospheric electricity and ionospheric measurements" (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 353-357).

See CD (program Seenck.exe, menu item AtmElectr).

Hourly means of the
1999

Date	00	01	02	03	04	05	06	07	08	09	10	11
990101	-50	-40	-40	-30	-30	-20	-30	-40	[-30]	-20	-50	-70
990102	-80	-50	-40	-50	-70	-50	-50	[-50]	-50	-90	-100	-70
990103	10	30	20	0	10	40	60	30	[50]	50	70	60
990104	0	60	70	70	110	70	30	-	-	60	50	50
990105	20	30	50	50	60	50	70	[70]	-	80	80	70
990106	80	80	90	80	80	120	130	150	100	120	130	100
990107	130	130	130	140	120	120	[120]	70	80	80	70	80
990108	20	0	0	20	30	30	30	[40]	40	40	40	40
990109	0	-S	OBS	+S	20	20	40	[90]	70	40	40	50
990110	70	80	80	80	40	20	20	40	[70]	80	70	60
990111	-10	10	10	40	50	10	0	-	-	OBS	-10	0
990112	10	30	30	40	40	60	60	[40]	40	-	70	30
990113	0	-10	-10	10	20	40	20	-10	-20	30	80	70
990114	40	30	20	30	30	40	40	[60]	60	70	80	80
990115	30	30	30	30	30	40	40	[40]	60	60	60	60
990116	120	120	100	100	90	110	80	80	120	100	100	120
990117	100	140	100	80	60	80	90	130	110	140	140	120
990118	10	10	30	40	60	90	100	-	-	80	60	30
990119	50	50	50	60	50	40	40	-	-	70	70	60
990120	0	-30	30	-10	-10	60	30	30	40	30	-10	50
990121	-50	-40	-90	-20	-40	-60	-10	[-70]	-	-50	-60	-10
990122	70	30	40	40	30	30	40	30	40	20	40	40
990123	20	30	10	20	10	10	20	[30]	50	10	-10	-10
990124	-20	-30	20	10	20	20	0	-10	[10]	[-50]	0	-10
990125	-20	-10	10	0	0	-10	-20	-	-	-10	-10	-10
990126	-30	-10	-30	-30	-30	-10	-30	[10]	-40	-20	10	0
990127	OBS	-80	-10	20	10	10	[10]	10	10	10	0	10
990128	20	10	-20	10	20	30	40	[50]	60	50	50	40
990129	50	70	80	40	60	-S	OBS	[10]	-20	30	30	20
990130	40	40	40	40	40	40	50	50	[50]	50	60	70
990131	50	40	30	30	40	50	60	50	[60]	70	70	90

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
-30	-50	-70	-60	-50	-40	-20	-10	-10	-70	-30	-60	-42
-70	-60	-30	-50	-40	0	0	30	10	-60	-50	-30	-46
50	50	50	40	40	20	0	20	30	0	10	-10	30
50	70	50	40	20	30	10	10	10	30	30	20	-
60	40	50	40	50	70	110	80	90	130	180	130	72
130	120	130	140	90	80	80	130	130	150	160	150	115
90	130	130	80	80	100	130	130	80	80	70	30	100
20	30	40	60	60	60	30	40	30	20	10	0	30
40	40	40	50	60	60	50	40	60	60	70	70	-
60	50	80	80	100	90	-30	20	-30	-10	10	-50	45
-20	-10	-20	-50	-60	-10	-10	-10	0	-20	-20	0	-
30	10	30	60	+S	+S	+S	220	+S	+S	120	30	-
70	60	[50]	50	40	30	20	30	10	30	30	40	28
80	80	50	80	80	90	120	130	80	40	40	20	61
60	60	60	70	80	80	90	90	130	130	120	120	67
110	110	[90]	80	110	130	120	120	130	140	130	130	110
110	90	70	20	80	150	130	80	40	30	30	10	89
30	40	40	20	50	70	60	40	40	30	40	40	-
60	50	50	30	90	30	30	20	70	50	10	40	-
10	30	10	0	-30	-40	-40	-50	-100	-90	-50	-50	-8
-50	-40	20	30	0	-20	-30	0	0	30	20	30	-22
40	30	40	60	70	50	80	80	50	40	40	40	45
10	30	0	-40	-10	10	-40	-30	-20	-40	-30	-10	1
-50	-10	-20	30	-10	0	10	-10	10	10	0	0	-6
-10	-10	-30	-40	-40	-10	20	20	10	-40	-40	-40	-
-20	-10	-10	-30	-20	0	0	-50	-20	30	20	0	-13
10	20	20	40	60	70	60	70	80	70	30	10	24
40	40	50	50	40	40	20	0	10	30	40	40	32
40	50	50	50	50	OBS	60	50	50	50	50	50	-
70	60	50	50	50	60	60	60	60	50	60	50	52
100	90	80	80	80	90	90	110	90	80	70	70	70

Date	00	01	02	03	04	05	06	07	08	09	10	11
990201	70	80	80	80	80	100	90	-	[90]	100	100	110
990202	20	-30	30	-10	-20	20	70	110	110	80	20	20
990203	30	30	30	40	30	40	70	[70]	40	40	30	40
990204	-20	-10	20	60	20	40	20	20	0	0	20	10
990205	-10	20	20	20	20	20	40	[50]	50	30	30	20
990206	30	30	20	20	30	30	30	30	40	40	30	30
990207	30	30	20	20	20	20	30	[30]	30	30	0	40
990208	30	40	40	40	40	50	70	-	[50]	60	50	50
990209	50	40	40	30	30	30	[30]	30	30	30	30	40
990210	-50	-50	-80	-50	0	20	20	[20]	30	40	40	40
990211	30	30	20	10	-30	-S	-S	-S	-S	-S	0	-50
990212	-S	-80	-50	10	20	-20	0	[0]	-140	10	60	70
990213	-140	-90	-S	-S	-S	-S	-30	[-50]	-150	-50	-70	-S
990214	-S	-60	-30	-10	-10	0	-20	[-50]	-10	0	0	30
990215	10	0	10	10	20	20	30	-	-	70	50	50
990216	30	40	40	40	40	100	130	[100]	110	60	80	80
990217	30	30	30	30	30	40	40	[40]	40	40	30	-20
990218	30	40	40	30	30	40	40	[40]	50	40	40	40
990219	40	20	30	10	10	-70	OBS	-40	-60	10	60	40
990220	-S	-50	+S	-90	90	110	140	170	170	140	110	50
990221	40	40	40	40	40	40	30	[10]	40	OBS	OBS	OBS
990222	50	50	40	50	60	OBS	60	-	[70]	50	70	50
990223	40	30	30	30	30	30	40	[50]	50	40	40	40
990224	30	30	30	-S	70	80	50	[40]	40	40	30	20
990225	40	50	40	40	40	40	50	[60]	50	40	40	50
990226	70	50	50	50	40	40	50	[70]	70	70	50	30
990227	60	90	70	70	70	80	80	110	[90]	[80]	80	90
990228	50	50	50	50	50	60	60	[60]	80	120	90	90

12	13	14	15	16	17	18	19	20	21	22	23	Means
110	100	100	100	100	60	60	70	60	20	20	20	78
20	30	30	20	[10]	20	50	50	50	60	30	30	34
20	-50	-40	20	20	20	0	-10	0	-10	-10	-10	20
0	20	20	20	20	20	60	70	70	70	60	0	25
40	20	30	40	OBS	-S	OBS	40	40	40	30	30	-
40	[30]	30	40	40	40	50	40	30	30	30	30	33
50	70	70	70	100	20	20	20	30	30	20	30	36
50	50	50	50	50	50	50	40	50	40	0	40	47
40	40	40	30	40	20	30	0	20	10	0	-50	28
40	50	50	50	40	20	10	20	30	50	50	40	18
-90	-160	-160	-140	-S	-170	-40	-20	-50	-80	-50	-110	-
90	170	140	70	70	90	60	+S	+S	90	90	0	-
-S	30	70	20	-50	-70	-50	-140	-S	-S	-50	-60	-
20	40	30	40	50	50	50	40	30	30	30	30	12
50	40	50	50	50	50	50	50	50	50	40	40	-
60	40	30	10	50	80	70	50	70	30	40	OBS	60
-S	OBS	-S	60	50	+S	+S	-S	40	50	50	40	-
40	40	40	40	40	50	50	50	40	40	40	40	40
50	120	30	-10	40	10	50	40	40	-S	-140	-100	8
-50	30	40	10	80	+S	-S	80	70	70	40	40	-
10	0	40	50	70	120	100	90	100	80	50	60	-
30	40	50	50	50	40	40	50	50	40	40	30	-
40	-S	OBS	OBS	40	50	50	50	OBS	OBS	OBS	30	-
30	0	50	50	50	50	70	70	70	50	40	40	45
50	50	60	70	70	80	80	90	120	90	70	70	60
50	50	60	50	70	70	70	110	110	90	100	80	64
90	90	80	70	60	60	70	80	70	60	50	50	75
80	70	80	60	50	40	40	40	40	30	40	30	59

Date	00	01	02	03	04	05	06	07	08	09	10	11
990301	30	20	30	40	40	30	10	-	-	30	40	50
990302	10	20	10	20	30	30	40	[40]	30	10	-50	10
990303	70	70	60	50	60	40	50	[50]	60	60	50	50
990304	10	0	0	10	20	20	20	[30]	40	40	40	50
990305	30	30	30	30	40	40	30	[20]	-20	-50	-70	10
990306	50	60	60	60	60	60	70	[70]	50	50	50	40
990307	60	70	30	40	30	40	20	[0]	[OBS]	OBS	-S	30
990308	90	80	60	50	40	40	40	-	[40]	40	50	40
990309	20	30	30	30	10	30	40	[50]	70	70	70	60
990310	40	50	30	40	50	50	70	[80]	70	60	60	60
990311	40	30	40	40	40	30	30	[40]	50	50	50	70
990312	40	40	40	40	30	40	50	[50]	50	50	50	50
990313	40	40	30	50	50	40	40	[50]	70	80	80	110
990314	60	50	30	30	40	30	30	[40]	[20]	20	30	40
990315	10	-30	30	10	OBS	OBS	30	[50]	-	-	40	60
990316	50	70	80	40	30	60	80	[80]	[60]	40	20	0
990317	20	20	40	40	40	50	40	[30]	50	40	50	30
990318	10	0	30	30	20	-50	-50	-10	[60]	80	70	80
990319	40	40	30	10	10	-10	-10	[30]	50	60	60	60
990320	20	-10	-10	-20	0	10	20	-10	0	[0]	20	OBS
990321	-10	20	20	30	40	30	30	[20]	20	20	10	30
990322	20	20	0	0	30	40	40	-	[40]	40	30	40
990323	0	30	0	0	0	0	30	[40]	40	40	30	30
990324	30	30	30	10	20	40	40	[40]	40	40	30	40
990325	10	10	10	0	0	0	30	[50]	50	50	40	40
990326	20	10	10	10	0	0	0	0	0	10	10	10
990327	-30	-30	-30	-10	-30	-20	[-10]	[10]	10	30	10	30
990328	-	-	-	-	-	-	-	-	-	-	-	-
990329	-	-	-	-	-	-	-	-	[20]	OBS	40	30
990330	10	10	20	10	0	20	[30]	30	10	0	0	10
990331	-80	-20	10	10	10	20	[0]	20	40	50	5	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	50	40	50	5	50	40	-20	50	50	-
30	30	30	40	50	50	50	40	50	50	30	40	29
50	40	40	40	40	30	30	40	40	50	40	20	47
40	50	40	50	40	40	40	40	40	40	30	30	32
10	40	30	OBS	OBS	OBS	50	60	60	40	40	50	-
50	70	50	40	50	70	40	40	50	OBS	30	50	53
60	100	80	110	120	OBS	-S	190	170	140	120	110	-
40	30	40	40	40	50	40	50	40	40	30	10	44
50	50	50	50	50	60	80	60	70	60	50	40	49
50	50	50	50	50	50	10	-10	10	40	30	30	45
70	70	70	70	70	80	80	70	70	50	50	50	55
50	60	90	90	100	90	100	120	100	100	70	40	64
110	120	120	120	100	120	120	110	120	70	50	50	79
40	40	40	40	30	10	30	30	20	10	10	-10	30
40	30	40	40	30	20	20	60	80	70	70	60	-
10	40	60	40	30	10	30	20	0	30	20	10	38
50	70	60	60	60	40	-60	-70	-40	-20	-10	0	25
80	70	70	70	70	60	50	60	50	50	60	40	42
60	60	60	60	40	40	70	60	40	40	40	30	40
OBS	50	20	0	OBS	0	20	20	20	30	10	-10	-
40	40	40	40	40	60	70	70	50	40	30	20	33
60	50	50	40	30	30	20	10	10	10	10	10	27
30	30	30	30	30	50	30	-20	0	20	20	20	21
50	50	40	50	40	40	60	40	30	10	0	10	34
40	30	20	20	20	20	30	30	40	30	20	20	25
10	10	10	0	10	30	30	20	-10	-10	-40	-40	4
40	40	40	40	30	10	10	10	0	10	0	0	7
-	-	-	-	-	-	-	-	-	-	-	-	-
20	40	OBS	50	40	20	0	20	10	20	-	-	-
30	40	30	40	30	-10	-50	-40	-40	-50	-50	-60	1
50	50	50	60	70	60	40	40	30	10	10	10	27

Date	00	01	02	03	04	05	06	07	08	09	10	11
990401	30	10	-50	-50	-50	-60	[-50]	-30	30	0	40	50
990402	30	20	20	20	20	20	[30]	40	40	40	70	50
990403	40	40	40	40	40	50	[70]	70	80	70	80	60
990404	20	20	10	20	20	[30]	40	50	40	50	50	50
990405	30	10	10	10	20	30	-	40	30	30	40	40
990406	30	30	20	20	30	40	40	-	20	(30)	(40)	30
990407	+S	-S	10	10	10	-10	[20]	[50]	20	20	30	30
990408	0	0	10	20	30	0	[40]	40	40	30	20	20
990409	30	40	40	40	30	0	[40]	60	50	50	40	40
990410	30	30	20	20	30	30	[40]	40	50	60	60	70
990411	-50	-30	-40	OBS	OBS	OBS	-50	-	30	40	40	30
990412	40	30	30	40	40	40	[50]	-	50	40	40	20
990413	10	20	0	0	10	0	[-10]	10	10	-S	-S	-S
990414	30	30	30	40	40	5	[50]	40	40	40	40	40
990415	10	10	0	10	20	30	[10]	10	20	40	40	30
990416	30	10	20	10	0	10	0	[-90]	-60	-50	-90	-90
990417	-20	-80	-40	-10	-S	-50	[-50]	[-S]	-S	-40	-10	+S
990418	10	10	0	10	10	30	-	40	40	40	30	30
990419	20	20	10	20	30	40	-	-	40	30	30	40
990420	10	10	20	10	10	30	[20]	30	30	30	30	30
990421	10	10	10	10	10	20	[30]	40	40	50	50	50
990422	-50	-80	0	-10	-10	0	[10]	30	-	30	40	40
990423	40	40	30	40	30	20	[20]	40	30	0	0	-S
990424	30	30	-20	10	20	20	60	70	50	50	50	[60]
990425	30	30	60	50	40	-20	[0]	40	70	50	60	40
990426	40	40	40	20	40	50	-	-	60	60	60	60
990427	20	20	20	20	30	40	[40]	50	40	40	40	50
990428	60	20	-10	10	10	30	30	30	20	20	20	20
990429	30	20	30	30	[30]	[40]	60	50	[50]	40	40	40
990430	30	30	40	30	30	10	0	0	10	0	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	60	60	50	60	60	40	30	40	30	30	30	19
50	50	40	50	30	-50	-50	20	30	30	40	50	23
50	40	40	60	70	70	40	70	60	40	30	20	53
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40	40	40	40	30	20	30	30	20	20	10	10	-
10	-10	-10	-10	OBS	OBS	OBS	OBS	OBS	-40	0	-10	-
40	40	-30	40	40	50	40	50	50	40	30	30	29
40	40	50	50	50	60	40	40	40	40	40	40	43
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20	30	20	10	30	10	20	20	20	0	40	30	-
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20	30	40	40	40	50	50	40	40	40	30	40	29
-60	-30	-10	10	40	50	40	OBS	OBS	-30	0	40	-
-30	20	30	40	40	30	20	-10	-10	10	70	30	-
30	40	40	40	30	30	+S	10	40	30	30	20	27
40	40	40	30	20	+S	40	30	30	30	20	20	-
50	10	30	30	30	20	30	30	20	10	10	10	23
40	40	30	30	30	30	10	10	10	-20	-40	0	21
10	40	40	40	40	40	60	40	40	40	20	30	19
OBS	OBS	OBS	OBS	40	60	70	60	50	40	20	20	-
50	20	-S	OBS	OBS	OBS	+S	30	40	60	60	50	-
60	60	30	70	80	60	40	50	50	50	40	40	45
0	70	70	60	60	70	70	50	60	60	30	30	-
OBS	OBS	OBS	OBS	OBS	OBS	OBS	50	-60	0	30	40	-
40	40	50	50	50	40	40	OBS	20	20	20	30	29
40	40	40	40	40	40	40	50	40	40	30	30	39
30	40	30	30	40	40	30	20	10	20	20	20	24

Date	00	01	02	03	04	05	06	07	08	09	10	11
990501	10	10	10	10	10	10	[20]	20	10	10	20	20
990502	0	-10	0	10	10	30	40	40	30	30	40	60
990503	20	10	30	40	40	50	-	[50]	40	50	40	50
990504	20	20	20	30	40	40	[50]	40	40	40	30	-20
990505	OBS	0	-20	OBS	-70	-20	0	50	30	20	20	40
990506	40	30	30	30	40	40	[30]	40	50	50	50	60
990507	30	20	30	10	10	-50	[-20]	0	0	10	30	40
990508	30	40	30	30	40	30	30	40	40	40	40	40
990509	-50	10	0	10	20	30	[60]	50	50	50	40	40
990510	40	30	20	30	30	40	-	-	40	40	40	40
990511	30	30	40	40	30	30	[10]	20	20	20	30	10
990512	40	50	40	40	20	40	[40]	70	60	7	50	50
990513	-10	0	10	20	20	10	[40]	70	60	40	40	40
990514	20	0	-30	20	30	20	10	-S	-S	20	50	30
990515	30	20	20	20	20	50	[40]	50	60	30	20	40
990516	40	80	40	40	50	60	[60]	70	60	60	40	50
990517	50	50	40	40	40	70	-	[60]	40	30	30	30
990518	10	10	10	10	10	10	[20]	20	2	20	20	20
990519	20	20	20	20	20	20	[20]	30	30	40	30	30
990520	20	20	20	20	20	20	[20]	20	20	30	30	40
990521	OBS	OBS	60	70	50	60	30	30	40	50	40	30
990522	20	20	20	30	30	[60]	70	60	40	50	60	50
990523	20	20	30	30	30	20	[20]	30	30	30	40	40
990524	20	20	20	20	10	20	[30]	-	60	70	70	70
990525	20	20	20	30	30	30	30	-	[50]	60	60	70
990526	20	30	20	20	10	10	[20]	20	30	50	60	70
990527	30	30	10	20	30	60	[40]	40	30	50	40	50
990528	30	30	30	30	40	60	[50]	40	40	50	50	50
990529	30	20	40	20	30	60	50	[40]	40	50	50	50
990530	20	20	10	20	30	30	30	[20]	20	40	40	60
990531	20	30	40	30	30	40	-	-	30	60	80	80

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	50	40	10	30	10	10	20	30	10	-10	10	17
100	50	-10	10	40	30	40	40	30	20	30	30	29
50	60	60	60	40	30	40	40	30	30	20	20	39
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50	50	60	50	50	50	50	40	40	40	40	40	36
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20	10	20	20	30	30	30	20	10	20	30	30	24
50	40	50	60	60	40	40	40	30	30	20	30	44
40	40	50	50	50	50	40	40	40	40	30	30	35
50	50	50	50	40	30	50	50	50	40	40	40	-
50	50	60	70	50	50	30	30	40	40	40	40	40
40	40	40	40	40	40	40	40	40	30	30	40	46
30	30	30	30	30	30	20	20	20	20	20	10	33
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30	30	40	40	40	40	30	30	30	30	30	30	29
-S	-S	+S	0	20	10	-50	OBS	OBS	20	OBS	OBS	-
OBS	+S	-S	-S	OBS	60	30	40	30	30	30	30	-
40	50	60	60	50	30	20	20	20	20	30	30	39
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70	80	70	70	70	50	40	30	20	10	10	10	41
60	70	80	40	30	30	30	20	10	10	10	20	32
50	50	50	60	50	40	40	40	30	2	10	10	37
60	70	70	50	50	50	40	30	30	20	20	30	43
50	50	50	60	50	50	40	40	30	30	20	20	40
60	60	70	70	60	50	50	40	30	20	10	10	36
80	70	50	70	50	40	40	30	+S	OBS	OBS	OBS	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
990601	-S	70	30	10	30	30	40	[40]	30	40	50	60
990602	10	10	20	30	30	30	30	30	[30]	30	40	40
990603	-60	-20	+S	30	30	30	[40]	40	30	40	40	40
990604	10	10	10	10	20	20	[20]	20	30	30	+S	40
990605	30	30	30	30	30	50	[80]	80	80	80	80	70
990606	30	30	20	20	30	30	20	[20]	10	20	30	40
990607	30	30	30	30	30	30	-	-	40	50	50	50
990608	+S	30	30	30	30	40	[20]	OBS	-S	50	40	30
990609	-	-	-	30	30	40	[60]	70	60	70	70	60
990610	40	40	30	30	40	40	[40]	50	60	80	80	80
990611	20	20	20	20	0	40	[40]	40	40	50	60	60
990612	+S	+S	20	20	40	60	80	[60]	50	50	50	50
990613	60	70	70	50	50	50	40	[40]	50	50	80	70
990614	50	50	40	40	40	40	-	-	-	50	50	60
990615	30	30	40	30	30	20	[20]	30	40	40	50	40
990616	OBS	OBS	+S	10	20	30	[40]	30	40	40	50	50
990617	30	20	30	30	30	20	[10]	20	20	20	30	20
990618	20	10	20	20	30	30	[40]	30	20	30	10	10
990619	50	50	50	50	50	50	[50]	50	50	50	50	50
990620	40	40	40	40	40	40	[30]	20	40	50	50	50
990621	30	30	20	30	20	30	-	OBS	-S	0	20	+S
990622	-	-	-	-	-	-	-	-	10	10	30	70
990623	40	30	30	20	40	40	[40]	50	40	40	40	40
990624	40	40	40	40	50	50	50	50	60	50	50	40
990625	30	30	30	20	30	40	[40]	40	40	50	50	60
990626	10	0	0	10	20	30	30	30	20	30	30	30
990627	10	20	30	30	30	20	30	[20]	30	40	40	40
990628	10	20	20	10	20	40	-	[30]	30	30	50	60
990629	20	30	30	30	30	30	30	[40]	3	60	60	70
990630	30	30	20	10	20	30	[30]	30	40	60	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	70	60	70	50	40	40	30	30	20	10	10	41
50	50	60	60	50	50	40	40	30	40	30	20	35
40	40	60	60	50	40	30	20	10	10	10	10	27
-S	OBS	OBS	OBS	OBS	-S	50	30	30	30	40	40	-
50	50	60	70	50	50	50	40	40	30	30	30	51
40	40	50	50	50	50	50	40	40	40	40	40	35
60	50	60	60	50	50	40	40	40	+S	OBS	OBS	-
40	40	0	OBS	OBS	OBS	OBS	+S	-	-	-	-	-
70	60	60	60	60	60	60	60	60	50	50	40	-
70	70	70	70	70	60	40	40	30	30	30	20	50
60	60	70	40	40	50	OBS	OBS	OBS	OBS	-S	+S	-
60	60	60	60	70	70	70	70	80	80	70	60	-
40	60	60	60	70	70	60	50	50	50	50	50	56
60	60	80	70	60	50	50	50	50	40	40	30	-
50	40	50	50	40	+S	-S	OBS	10	20	-10	-10	-
40	60	50	50	50	50	40	40	40	40	30	40	-
30	40	40	50	50	40	40	40	20	20	20	30	29
20	30	40	40	50	50	50	50	60	50	50	50	34
50	50	50	50	40	40	50	50	50	50	50	40	49
50	50	50	50	50	50	40	40	40	30	20	20	40
OBS	-20	-10	-	-	-	-	-	-	-	-	-	-
-S	-S	10	10	40	10	20	40	40	40	30	40	-
40	40	40	40	50	50	50	40	50	70	40	40	42
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40	50	50	40	40	40	30	20	20	10	30	10	30
60	70	-S	OBS	70	40	30	30	30	30	10	10	-
60	60	70	80	70	40	30	30	40	30	30	30	43
50	50	50	50	40	40	40	30	30	30	30	30	36

Date	00	01	02	03	04	05	06	07	08	09	10	11
990701	20	20	20	20	30	30	[30]	20	30	30	30	30
990702	20	10	20	20	30	30	[30]	30	30	40	50	50
990703	10	10	20	20	30	40	[60]	60	60	70	80	80
990704	10	20	20	20	30	30	30	[30]	30	30	40	50
990705	30	30	30	30	30	30	[30]	—	20	30	40	40
990706	10	20	20	20	30	30	[40]	40	40	40	40	40
990707	10	10	10	10	—S	+S	—S	OBS	OBS	OBS	OBS	OBS
990708	30	0	0	30	40	70	[30]	30	40	30	30	40
990709	10	30	30	30	20	10	20	70	OBS	—S	50	OBS
990710	OBS	OBS	—S	OBS	OBS	OBS	OBS	+S	50	100	100	110
990711	20	20	50	OBS	10	20	50	[60]	80	60	40	50
990712	OBS	20	30	30	30	70	—	—	—	50	—	50
990713	20	10	10	30	30	20	[40]	30	40	40	40	40
990714	40	OBS	80	—S	—S	60	[40]	[40]	100	40	100	0
990715	20	10	10	20	40	50	[40]	30	30	40	40	40
990716	30	30	20	30	30	40	50	[40]	30	60	60	60
990717	30	30	30	40	40	40	[40]	50	50	70	70	80
990718	20	10	20	30	30	50	50	[40]	40	60	80	80
990719	20	20	20	20	30	50	40	—	[40]	50	50	50
990720	10	10	10	20	30	40	[40]	40	40	50	50	60
990721	20	10	30	20	20	30	[40]	40	40	50	60	60
990722	20	70	70	50	40	40	—	60	50	60	0	10
990723	—S	OBS	+S	20	30	70	[60]	80	60	50	40	40
990724	20	20	20	20	10	0	30	40	40	40	40	40
990725	40	30	20	30	30	20	20	[30]	4	50	50	50
990726	40	30	30	40	40	40	[40]	—	30	30	40	50
990727	20	30	30	30	40	30	[30]	30	30	30	40	40
990728	20	20	20	20	30	40	[40]	40	40	60	60	60
990729	40	30	30	30	30	40	[40]	50	40	40	60	50
990730	40	30	30	30	30	40	[50]	50	60	60	70	60
990731	20	30	30	30	40	40	[50]	40	50	60	70	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	60	50	40	30	30	30	30	30	30	33
60	60	-S	OBS	-S	30	20	10	10	10	10	10	-
80	80	80	80	70	40	30	30	30	10	10	10	45
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40	40	50	50	40	40	40	40	30	30	30	10	34
OBS	+S	120	50	40	30	10	20	30	20	10	10	-
50	40	30	40	40	30	-10	0	10	0	-10	-10	24
40	50	30	40	40	20	20	10	30	-S	OBS	OBS	-
-S	OBS	100	OBS	OBS	OBS	-10	OBS	-S	10	20	30	-
40	0	-S	OBS	40	50	40	40	40	50	30	-S	-
20	-20	-S	OBS	80	40	40	40	40	30	10	20	-
50	60	70	50	40	70	60	40	40	30	40	40	39
30	20	10	20	30	30	30	20	20	20	10	20	-
40	40	40	40	40	40	40	30	40	30	20	30	33
50	60	40	50	60	60	40	40	30	20	20	20	40
60	70	70	80	60	60	40	40	30	30	30	30	49
80	90	90	90	60	50	40	40	30	30	30	30	49
50	50	50	50	40	40	40	30	30	20	20	20	37
70	70	70	60	+S	40	50	40	40	40	40	30	41
50	40	50	40	40	+S	OBS	+S	20	20	10	10	-
20	10	0	30	0	OBS	OBS	OBS	-10	-40	-S	-10	-
40	40	30	10	0	20	30	20	10	30	30	30	-
40	[40]	40	40	40	40	50	40	40	40	40	40	35
50	50	50	40	50	50	50	40	40	40	40	40	40
50	60	50	50	60	40	40	40	50	60	40	30	43
40	50	70	60	60	50	40	40	40	40	40	30	39
60	70	60	60	50	40	40	30	40	40	40	50	43
40	40	50	40	40	40	40	40	40	40	40	30	40
60	70	60	70	50	40	30	10	30	30	30	20	44
60	60	60	40	20	20	20	20	30	20	20	10	38

Date	00	01	02	03	04	05	06	07	08	09	10	11
990801	20	10	10	10	10	20	40	[30]	[40]	60	60	70
990802	20	10	10	10	20	30	—	—	40	50	50	50
990803	10	10	10	20	20	50	50	50	[50]	50	50	50
990804	20	20	10	10	10	30	[40]	40	50	50	60	60
990805	10	10	20	10	10	20	20	[30]	30	30	30	30
990806	10	10	10	20	30	30	[40]	40	40	50	50	60
990807	20	20	10	10	20	[30]	30	30	30	50	50	60
990808	10	30	30	20	10	20	[50]	[50]	30	30	50	40
990809	50	40	30	30	30	40	40	—	40	40	40	30
990810	40	30	10	10	20	40	50	[40]	40	40	50	50
990811	10	10	0	−10	10	20	30	40	[80]	50	40	50
990812	40	40	40	40	40	50	[50]	60	70	60	60	60
990813	50	40	40	30	20	20	[20]	30	40	40	40	40
990814	30	20	10	20	20	30	[40]	40	40	40	40	40
990815	30	40	40	20	30	40	[40]	50	50	50	50	50
990816	10	0	10	0	10	10	—	—	70	120	70	40
990817	30	40	70	50	70	70	[60]	80	70	60	50	50
990818	70	100	30	30	20	30	[40]	60	70	50	40	40
990819	40	40	40	50	40	40	[20]	40	30	40	50	50
990820	30	40	40	30	30	20	OBS	OBS	OBS	140	100	70
990821	40	50	20	30	20	80	[80]	80	80	40	40	40
990822	30	40	40	40	40	50	[60]	50	60	60	70	60
990823	40	40	40	40	40	40	[40]	—	60	70	50	50
990824	20	30	20	30	30	40	[40]	30	30	30	30	30
990825	20	20	20	20	30	40	[60]	40	30	40	40	50
990826	20	20	20	30	30	30	[30]	30	30	30	30	30
990827	40	40	30	20	10	0	[10]	30	10	40	70	30
990828	40	50	40	40	40	60	[50]	50	40	40	40	50
990829	30	20	0	10	30	30	20	10	50	30	30	40
990830	20	10	—	—	—	—	—	—	30	30	30	30
990831	30	30	30	40	40	60	[80]	[110]	90	50	40	30

Date	00	01	02	03	04	05	06	07	08	09	10	11
990901	30	30	40	30	30	[30]	[30]	40	40	40	40	0
990902	30	30	30	30	30	[20]	-S	-50	-80	-110	OBS	-S
990903	30	40	40	30	30	[30]	[-40]	-10	-10	30	60	50
990904	70	60	50	70	[110]	[70]	160	110	60	70	60	50
990905	40	60	60	60	60	50	70	[30]	0	20	-10	30
990906	40	40	30	30	20	30	[30]	-	40	40	40	40
990907	40	40	40	40	40	50	[60]	40	40	50	50	50
990908	30	30	40	30	40	50	[50]	40	40	40	40	40
990909	30	30	30	30	40	40	[70]	60	50	50	50	50
990910	40	30	30	40	40	50	[50]	50	50	50	60	50
990911	-	-	-	-	-	-	-	-	-	-	-	-
990912	-	-	-	-	-	-	-	-	-	60	90	70
990913	30	20	30	30	30	30	-	-	40	50	50	60
990914	20	30	30	30	30	30	[80]	60	40	30	30	50
990915	30	30	30	30	30	30	(60)	[60]	60	50	40	40
990916	30	30	40	30	30	50	[40]	50	30	30	40	50
990917	30	30	30	30	30	30	[30]	30	30	30	40	40
990918	10	10	10	20	20	30	[30]	40	40	40	30	30
990919	-S	20	30	30	30	30	30	[20]	10	30	30	30
990920	20	20	30	30	10	10	-	-	30	40	40	40
990921	20	10	10	20	10	30	+S	+S	OBS	OBS	OBS	0
990922	20	20	40	40	40	[40]	70	(70)	50	60	60	60
990923	60	60	50	70	90	90	[100]	60	50	40	40	30
990924	30	30	20	20	30	30	[40]	50	50	4	40	40
990925	30	30	30	40	40	40	[50]	50	40	40	50	40
990926	30	30	30	40	40	40	[40]	70	50	40	50	50
990927	40	40	40	40	40	40	-	-	40	40	40	40
990928	40	40	40	20	50	90	[110]	80	50	30	40	40
990929	40	50	30	30	30	40	[60]	70	50	50	50	50
990930	30	30	40	30	20	40	40	50	50	5	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
20	-30	OBS	20	20	+S	+S	40	50	50	40	30	-
60	40	40	40	40	40	40	40	40	30	30	30	-
30	30	30	OBS	-S	-10	20	30	30	30	4	50	-
30	30	40	20	20	30	30	30	30	30	30	30	54
20	30	30	30	30	50	50	40	50	40	50	40	39
50	50	50	40	50	50	40	40	40	40	40	40	40
60	70	70	70	40	40	50	50	50	40	30	30	48
40	40	-S	OBS	40	40	40	50	40	40	30	30	-
50	60	30	60	0	20	30	30	50	50	40	50	42
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
80	70	60	50	50	50	30	30	30	30	20	30	-
60	70	50	50	40	40	30	30	30	30	30	30	-
40	50	40	30	30	30	30	30	30	30	30	30	36
40	50	50	30	30	30	30	30	30	30	30	30	37
60	70	70	60	60	50	40	40	30	30	30	30	43
40	40	50	40	30	30	30	30	20	20	20	20	31
30	30	30	30	30	30	30	30	30	30	10	OBS	27
30	30	30	30	30	30	30	30	30	30	30	20	28
40	30	40	30	40	40	40	40	40	30	20	30	-
-30	0	20	20	20	30	30	-S	OBS	30	40	30	-
70	70	60	70	60	60	50	50	40	40	50	50	51
40	50	40	40	50	50	50	50	40	40	20	30	52
50	60	60	50	50	50	40	40	40	30	20	30	39
40	40	40	40	40	40	60	50	50	50	40	30	42
50	60	50	60	50	40	40	30	-S	OBS	OBS	30	-
30	30	30	30	30	40	40	40	40	30	40	40	-
40	40	20	OBS	OBS	OBS	+S	0	20	30	30	30	-
50	50	40	40	40	40	40	50	50	50	40	50	45
[40]	40	30	20	30	20	20	20	10	30	30	20	33

Date	00	01	02	03	04	05	06	07	08	09	10	11
991001	20	10	10	30	30	10	[0]	40	20	30	50	50
991002	30	30	30	30	20	30	40	40	40	40	40	40
991003	20	30	20	30	40	[40]	40	50	40	40	40	40
991004	20	10	10	0	10	10	-	-	20	30	40	40
991005	30	30	30	20	30	30	[40]	40	40	40	40	40
991006	20	10	10	10	20	30	[30]	30	30	30	40	40
991007	30	30	30	30	30	40	[50]	50	40	30	40	40
991008	30	30	30	30	30	[30]	40	(40)	40	40	40	40
991009	40	40	30	30	30	[20]	-10	10	0	10	20	40
991010	20	20	30	20	30	40	[40]	30	40	20	30	40
991011	40	40	40	30	40	40	-	-	40	50	40	50
991012	40	30	30	30	20	30	40	[40]	40	40	40	40
991013	30	30	30	30	40	40	[30]	[40]	40	30	10	30
991014	40	40	40	30	30	40	[50]	60	60	40	40	50
991015	-10	OBS	-30	-10	-10	0	[30]	70	80	80	70	70
991016	40	50	40	40	40	50	[50]	50	60	60	60	50
991017	30	30	30	40	40	40	60	[60]	60	50	40	40
991018	20	30	30	30	30	30	-	-	40	40	50	50
991019	40	30	40	40	50	50	[60]	50	50	40	40	40
991020	40	40	40	40	40	40	[30]	30	40	40	40	40
991021	-10	0	10	-10	-10	0	[-10]	-20	-20	-20	-10	-10
991022	30	30	20	20	10	0	-	-10	-10	-10	-10	-10
991023	-30	-10	-10	-10	-10	-20	[-10]	0	0	-10	-10	-30
991024	0	-60	-S	-S	20	-10	[-10]	20	60	70	30	10
991025	30	20	30	30	30	40	-	-	40	50	50	40
991026	-30	-10	10	20	40	40	[40]	110	80	20	40	20
991027	10	10	20	20	30	30	[40]	50	40	40	40	40
991028	40	40	30	20	20	30	[40]	50	70	60	50	50
991029	50	30	-40	+S	-40	+S	[30]	10	-	40	70	50
991030	30	30	30	40	30	40	[30]	20	-10	-10	-10	-10
991031	-50	-40	-40	-30	-20	0	20	-20	[20]	60	50	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	40	40	40	40	40	50	40	40	40	30	33
40	40	50	50	40	40	30	20	20	10	10	20	33
40	40	40	40	40	30	40	50	40	20	10	20	35
40	40	50	40	50	40	40	40	20	20	30	30	—
40	30	30	40	30	30	40	30	30	30	30	20	33
30	30	30	40	40	40	40	40	30	30	30	20	29
40	40	50	40	40	50	50	50	50	40	30	20	39
50	50	40	40	50	50	50	50	40	40	40	40	40
30	40	50	40	30	30	40	30	20	30	40	40	28
40	—	—	40	40	50	50	50	40	50	40	40	—
50	60	50	40	40	50	40	40	40	40	40	40	—
50	50	60	40	40	30	40	40	40	40	40	30	38
30	40	50	60	60	70	60	60	50	40	40	60	42
50	50	60	50	50	50	40	80	40	50	40	—10	45
70	70	60	60	40	50	60	80	60	50	30	40	44
50	50	50	50	50	40	50	50	40	40	30	30	47
40	40	40	30	30	40	50	60	40	40	40	30	42
40	40	40	50	50	60	50	50	50	40	40	40	—
40	30	40	40	40	40	50	40	40	30	40	40	42
40	40	40	40	40	40	30	20	10	20	10	10	33
0	10	20	20	20	10	10	20	20	10	30	40	4
0	—10	0	20	—10	—30	—40	—30	—30	—40	—50	—40	—9
—10	0	10	20	30	30	30	10	0	—10	—10	—10	—3
10	30	40	50	30	30	40	40	40	30	30	40	—
50	50	40	50	50	50	40	40	40	40	20	0	—
20	20	30	30	60	60	60	60	40	OBS	—30	0	32
40	40	40	50	50	60	70	50	50	40	40	40	39
60	50	40	30	30	30	30	30	30	80	40	30	41
50	60	60	60	60	50	50	60	40	40	40	40	—
—10	—10	—10	—20	—10	—10	—20	—20	—40	—50	—40	—40	—3
40	40	30	40	40	40	40	50	50	40	40	40	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
991101	40	20	20	10	10	10	10	–	–	30	30	30
991102	10	20	20	30	30	40	30	[40]	30	30	30	30
991103	20	20	20	40	60	[70]	30	40	30	20	0	–10
991104	20	30	30	20	20	20	10	[10]	0	0	10	20
991105	0	0	0	0	0	–10	–10	[–30]	–40	–50	–40	–30
991106	–30	–10	0	0	0	0	[–10]	–10	0	–10	0	20
991107	0	10	20	–20	–10	0	0	0	–10	10	10	10
991108	–20	–30	0	0	10	10	20	–	10	20	40	50
991109	20	20	20	20	0	–	–	–	[–S]	–S	–30	+S
991110	OBS	–S	–S	–S	–	–	–S	[–S]	–S	10	10	20
991111	10	20	20	20	20	20	20	[20]	30	30	20	–
991112	80	70	50	30	30	60	40	[30]	40	30	40	50
991113	30	30	40	20	30	30	30	[40]	40	30	40	40
991114	40	40	30	30	30	20	30	[30]	40	40	40	40
991115	40	20	10	20	30	30	60	–	[50]	50	50	40
991116	60	50	50	50	40	40	40	[40]	10	10	20	40
991117	40	40	30	40	20	30	50	[40]	50	50	40	40
991118	40	10	30	40	40	40	40	40	[50]	40	40	40
991119	40	20	30	40	40	30	50	[80]	30	+S	OBS	OBS
991120	20	20	30	40	40	40	40	50	50	70	60	50
991121	50	40	40	50	50	60	50	60	50	[50]	50	50
991122	50	30	30	40	40	30	40	–	–	30	40	50
991123	40	30	30	30	10	20	20	[20]	0	10	20	30
991124	30	20	10	10	10	0	–10	[–30]	–50	–50	10	40
991125	10	10	30	40	40	50	50	[50]	50	50	50	40
991126	40	30	40	50	50	60	60	[50]	50	70	60	70
991127	–40	–30	–20	0	10	20	10	0	–10	–10	–10	–10
991128	20	20	20	20	30	30	20	0	[20]	30	20	10
991129	–20	–50	–40	0	0	0	[0]	–	20	0	–30	–30
991130	30	20	40	50	40	30	50	[40]	(40)	30	30	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	40	40	20	10	0	-10	0	20	20	20	10	-
30	30	20	20	20	20	70	60	50	40	30	30	32
-10	-10	-10	-10	10	10	0	10	20	20	20	20	17
20	30	20	20	20	10	20	20	20	10	10	10	17
-30	-30	-30	-30	-30	-30	-40	-20	-20	-30	-20	-20	-23
40	30	30	20	20	40	30	20	-50	-10	10	0	5
20	20	20	20	20	30	30	30	20	10	20	10	11
50	60	50	40	70	70	50	50	40	40	30	20	30
-S	OBS	-	-S	-S	-S	-S	-S	-	-	-	OBS	-
20	20	10	10	20	10	20	20	0	20	20	20	-
-	20	30	30	30	40	40	80	80	80	70	80	-
40	40	40	50	50	40	40	50	40	40	40	30	44
40	40	40	50	60	50	40	20	10	30	40	40	36
50	60	60	30	20	30	40	50	50	30	20	30	37
40	50	60	60	50	60	70	70	70	60	70	70	49
50	50	50	50	60	50	50	50	30	OBS	OBS	10	-
40	40	30	OBS	+S	60	70	50	60	90	80	30	-
40	40	50	50	50	50	70	60	70	60	30	30	44
-S	50	+S	+S	+S	-S	70	-S	4	10	10	10	-
60	50	[70]	60	60	70	50	50	70	60	50	50	50
70	60	80	OBS	OBS	OBS	20	40	40	30	30	30	-
50	40	30	30	30	10	20	20	20	20	30	40	-
30	30	30	20	20	10	10	10	20	20	30	30	22
20	10	20	20	10	-40	40	50	20	0	0	10	6
40	40	30	40	40	30	50	40	30	40	40	40	39
70	70	50	50	40	30	20	30	30	20	0	-30	42
10	0	10	[20]	20	20	30	10	30	30	20	30	6
20	0	10	10	10	10	10	0	10	0	0	-10	13
-20	-30	-70	-70	-50	-40	-60	-40	-40	-50	-30	-30	-30
30	30	30	30	20	-50	-10	-10	0	0	-10	0	20

Date	00	01	02	03	04	05	06	07	08	09	10	11
991201	30	0	-10	0	30	10	-20	[-10]	30	0	30	40
991202	40	60	60	60	50	50	50	[70]	50	70	50	50
991203	-50	10	20	40	40	30	40	[40]	30	40	30	30
991204	40	30	40	40	50	50	40	40	50	50	50	70
991205	10	20	20	0	0	OBS	40	OBS	30	40	40	50
991206	40	50	40	40	40	40	40	-	-	50	50	50
991207	40	40	40	40	40	40	50	[30]	40	40	50	50
991208	40	50	40	50	40	30	40	[20]	40	50	50	50
991209	10	30	50	50	50	60	50	[70]	80	130	130	80
991210	10	30	10	20	30	50	40	[50]	50	50	50	-
991211	OBS	OBS	-S	-S	-S	-	-	-	70	90	70	30
991212	50	40	20	40	30	40	40	20	[30]	20	30	40
991213	-	-	-	-	-	-	-	-	-	-	50	50
991214	40	40	30	40	40	40	40	[50]	50	50	50	50
991215	40	40	40	40	40	40	40	[40]	(40)	70	60	50
991216	40	40	40	40	40	30	[40]	40	50	50	40	50
991217	50	50	50	50	40	60	50	50	50	[60]	[40]	40
991218	30	50	50	30	10	20	40	[40]	50	50	60	60
991219	70	50	40	70	60	70	60	[60]	-20	-20	40	30
991220	30	30	-10	30	10	20	10	-	-	50	50	50
991221	50	40	40	30	30	40	40	[40]	40	50	50	50
991222	70	60	50	50	50	50	70	[90]	70	70	60	70
991223	10	0	10	10	20	20	10	[0]	0	-10	10	30
991224	-50	-40	-60	-60	-30	-10	-10	-50	[-70]	-60	-50	-50
991225	-70	-50	-50	-60	-70	-60	[-60]	-70	-80	-70	-60	-50
991226	70	60	80	90	70	80	30	60	50	30	20	-50
991227	50	40	30	50	30	30	0	70	70	60	-	-
991228	40	50	50	40	OBS	-S	-S	[-S]	OBS	OBS	OBS	OBS
991229	40	30	30	30	30	30	30	[40]	[50]	50	50	50
991230	30	-10	10	20	20	20	40	3	[40]	40	50	+S
991231	40	40	30	20	30	20	30	[50]	60	60	70	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	30	20	-20	30	60	80	100	50	40	30	50	26
50	70	60	60	50	40	40	40	40	0	0	10	47
20	-20	-10	-20	-30	-10	30	20	30	40	40	40	18
70	60	70	[40]	50	50	40	50	50	70	60	50	50
50	50	50	50	50	50	50	50	50	50	50	40	-
60	60	70	50	50	30	30	50	50	50	50	50	-
50	60	60	50	-30	-30	-40	0	30	30	30	40	31
50	40	50	40	60	60	40	50	40	20	0	10	40
30	30	20	20	30	40	40	40	30	30	10	0	46
50	50	70	70	60	50	50	50	-	-	-	OBS	-
40	30	30	50	50	30	30	50	40	40	40	50	-
50	50	50	60	40	40	50	-20	20	40	-	-	-
40	40	40	40	50	50	50	50	50	40	40	40	-
50	40	50	60	70	70	70	70	-50	30	50	50	45
50	60	60	60	80	60	60	50	60	40	40	40	50
60	50	50	50	70	80	90	90	90	70	60	50	55
50	60	50	50	40	50	60	50	70	70	60	50	52
50	70	50	80	80	80	80	80	90	80	80	70	58
20	30	50	50	OBS	100	50	40	50	50	60	40	46
60	50	50	60	60	70	60	50	50	40	40	40	-
40	40	40	40	40	50	60	70	80	110	80	90	52
70	70	70	60	90	7	80	70	60	30	10	0	60
50	50	50	20	-30	-20	-50	-70	-90	-80	50	-90	-8
-30	-30	-40	-50	-50	-50	-70	-60	-50	-50	-70	-50	-48
-50	-30	-20	30	10	-10	10	-10	OBS	-S	60	70	-
-	-30	-S	OBS	10	30	40	50	50	70	60	40	-
50	40	40	40	30	30	40	50	50	40	50	40	-
OBS	OBS	OBS	OBS	+S	+S	60	50	40	40	50	40	-
50	50	70	60	50	60	70	90	80	70	50	40	50
50	40	50	50	70	90	50	70	60	40	40	40	41
70	140	110	80	90	110	110	80	80	70	80	70	66

*Hourly means of the
2000*

Date	00	01	02	03	04	05	06	07	08	09	10	11
000101	70	70	60	60	50	40	50	[40]	60	80	80	130
000102	160	140	70	120	80	50	40	[70]	120	50	50	40
000103	20	20	20	10	30	70	130	170	–	80	90	120
000104	70	80	70	50	40	40	30	[50]	60	60	70	70
000105	80	110	80	60	70	80	60	[20]	70	70	70	70
000106	50	50	50	50	40	50	80	[120]	130	110	110	120
000107	80	70	80	110	130	140	110	[60]	70	70	70	80
000108	20	70	70	40	50	20	30	[10]	40	30	50	50
000109	–20	–20	–30	–40	–10	–10	–20	[0]	–20	10	40	20
000110	10	10	10	20	10	20	40	–	[50]	60	50	70
000111	50	80	50	40	40	40	30	[40]	50	60	70	70
000112	50	50	60	70	50	50	70	[60]	40	20	20	30
000113	–80	–100	–100	–20	–50	–10	–10	[10]	–20	20	40	50
000114	–50	–50	–60	–50	–40	–40	–40	[–30]	–30	–30	–20	0
000115	0	–10	–20	–40	–30	–20	–20	[–10]	30	20	20	30
000116	40	30	20	20	30	40	30	20	[30]	40	50	50
000117	50	40	30	20	30	40	20	–	–	30	40	40
000118	10	10	0	OBS	20	20	20	[0]	0	10	60	+S
000119	30	30	30	30	30	40	10	[40]	[–S]	30	40	40
000120	40	30	30	20	20	30	50	[70]	70	50	50	50
000121	30	30	30	30	40	30	30	[40]	[40]	40	40	OBS
000122	50	50	30	40	40	30	40	0	30	40	40	20
000123	40	20	30	30	30	30	20	[40]	40	60	120	110
000124	20	40	30	30	40	40	50	–	[50]	60	60	70
000125	10	30	20	20	20	30	40	[40]	50	50	50	40
000126	40	40	40	40	40	50	60	[80]	80	80	50	50
000127	40	30	30	20	30	40	50	[50]	50	60	60	60
000128	50	50	50	40	40	40	40	[40]	60	50	40	50
000129	30	30	30	10	10	10	20	30	[30]	50	50	60
000130	40	40	40	40	40	30	30	[–S]	OBS	OBS	OBS	OBS
000131	–50	10	30	50	70	80	100	90	–	–	–	–

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
120	110	100	120	110	80	90	100	140	210	90	120	91
40	70	30	30	30	0	20	50	90	100	80	50	66
90	90	80	180	90	120	120	120	120	60	70	80	86
80	90	80	50	40	60	70	70	60	120	130	120	69
70	50	40	60	70	60	70	60	50	60	70	50	65
180	100	130	120	180	200	170	170	160	180	80	80	113
70	110	70	70	70	120	190	210	130	70	30	30	93
50	40	40	-10	-20	-30	30	30	-10	0	20	0	26
10	20	10	20	20	40	50	70	40	10	0	10	8
70	60	50	40	30	20	0	0	30	20	40	40	-
70	60	60	50	60	70	50	60	70	70	60	80	58
40	20	-40	-10	70	60	30	30	-110	-70	-30	-20	22
-30	-30	-30	-40	-10	-10	-30	-20	-10	-40	-50	-50	-35
-20	-10	30	40	30	-10	-10	40	40	50	20	30	-9
40	50	50	70	70	50	40	40	50	50	50	40	23
50	40	50	50	50	50	60	50	70	80	70	50	45
50	50	40	40	40	40	40	20	10	10	10	30	-
OBS	OBS	20	40	60	50	50	+S	50	+S	40	30	-
40	40	40	50	50	50	-S	30	40	40	40	40	37
40	40	40	40	50	50	70	60	40	40	20	20	43
OBS	OBS	40	OBS	40	OBS	60	60	70	60	50	60	-
[10]	30	20	20	30	40	50	50	40	50	40	50	35
90	90	70	80	100	50	20	40	50	50	10	10	51
70	70	60	50	50	50	50	50	50	30	20	0	45
50	50	60	60	50	70	70	70	70	70	50	40	46
50	50	60	70	70	50	40	50	40	40	40	40	52
70	70	70	50	70	90	80	80	80	80	60	70	58
50	50	60	60	70	70	70	70	50	40	30	30	50
60	50	0	30	50	-30	30	40	30	10	40	20	29
-50	20	10	30	30	30	40	30	70	30	-10	-10	-
40	40	50	50	50	50	40	50	40	40	50	40	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
000201	30	30	20	20	40	40	50	[40]	50	40	–	50
000202	40	50	60	80	70	90	70	110	[80]	90	90	70
000203	30	20	30	40	40	40	50	[40]	40	40	40	40
000204	40	40	40	40	40	40	50	[60]	50	60	50	50
000205	30	40	40	40	40	40	[50]	60	70	60	50	40
000206	50	50	40	40	40	40	50	[50]	70	60	50	70
000207	90	70	60	60	50	30	70	–	120	110	120	100
000208	10	10	20	10	0	20	30	[30]	40	60	50	50
000209	30	30	40	30	20	–S	30	[40]	[40]	40	40	40
000210	40	40	40	40	40	40	40	[40]	50	50	50	50
000211	20	30	40	40	40	50	70	[110]	100	80	60	40
000212	50	50	50	40	40	50	50	[40]	50	60	60	50
000213	50	50	40	50	50	50	40	[40]	30	40	50	50
000214	40	40	30	40	50	50	50	–	[50]	40	50	40
000215	50	40	40	30	30	40	40	[30]	30	20	30	40
000216	70	70	50	40	40	40	40	[30]	30	30	40	50
000217	40	40	40	40	40	30	40	[40]	40	40	40	50
000218	50	40	40	40	40	50	50	[70]	50	50	50	40
000219	30	30	30	50	50	30	60	[70]	80	60	50	70
000220	OBS	30	60	70	90	60	60	[60]	70	60	50	40
000221	40	50	40	30	40	50	50	–	[50]	50	50	30
000222	50	50	40	40	50	40	50	[70]	70	60	60	50
000223	30	20	20	10	20	30	+S	[+S]	OBS	OBS	30	30
000224	60	50	30	50	40	60	60	[50]	40	40	40	30
000225	–30	0	10	10	40	50	60	[60]	60	50	50	50
000226	50	40	40	30	40	50	50	[50]	60	50	50	60
000227	60	50	40	40	40	40	50	[50]	50	50	50	50
000228	–20	–20	–30	–40	–30	–30	–20	–	–	–40	–20	30
000229	–10	0	–10	–20	–40	10	40	[70]	60	60	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	60	60	60	70	80	70	70	90	70	70	60	53
60	70	70	70	50	60	60	70	60	70	20	30	66
40	30	30	50	40	OBS	OBS	50	40	40	50	40	—
40	40	40	20	20	30	40	40	40	40	50	50	42
50	40	40	50	50	60	60	70	50	70	50	50	50
50	50	70	60	50	50	60	70	70	70	90	100	58
110	120	130	120	140	120	80	50	30	10	30	20	80
50	50	50	50	50	50	20	—S	—S	—20	20	40	—
OBS	40	40	50	50	50	50	50	40	40	40	40	40
50	50	50	50	40	50	70	50	40	40	30	10	44
30	50	50	40	40	50	50	50	50	40	50	50	51
60	50	50	40	50	50	40	40	50	60	70	50	50
50	50	40	50	50	40	40	50	30	30	30	30	43
50	50	50	50	50	70	60	60	50	60	50	50	49
—S	30	50	60	70	70	70	60	50	50	70	70	47
40	+S	+S	30	40	30	50	50	50	50	50	50	—
50	60	60	60	50	50	60	60	50	50	40	40	46
50	50	60	50	50	40	40	40	50	40	40	30	46
50	70	50	60	60	60	50	70	40	40	40	40	52
30	30	40	50	30	30	30	40	40	50	30	30	47
20	70	70	50	60	70	70	80	80	70	60	70	54
50	60	70	60	50	70	70	70	40	40	30	20	53
60	70	0	110	40	50	30	60	70	110	80	60	—
30	40	40	40	30	30	30	30	0	—70	—150	—60	23
60	50	50	30	30	OBS	20	40	50	50	40	50	38
60	70	60	70	50	60	70	100	90	80	70	50	58
50	60	50	50	40	40	50	30	20	20	0	—10	40
50	50	50	50	50	50	40	40	40	40	30	10	—
40	40	40	30	20	30	—20	—60	—30	—10	10	20	15

Date	00	01	02	03	04	05	06	07	08	09	10	11
000301	20	10	0	0	-10	-30	-10	[20]	30	40	40	40
000302	-S	-10	-10	0	30	40	40	[40]	40	40	40	30
000303	30	30	30	30	20	30	40	[40]	40	50	50	50
000304	30	40	50	30	40	40	60	[70]	[60]	50	20	30
000305	10	-S	20	-30	OBS	OBS	OBS	OBS	OBS	-S	40	40
000306	50	40	50	50	30	40	30	-	-	40	50	50
000307	70	50	40	40	30	40	50	[70]	70	50	50	50
000308	20	20	10	10	20	40	40	[40]	50	20	10	10
000309	40	30	30	20	30	30	30	[40]	40	50	40	40
000310	OBS	50	OBS	OBS	OBS	OBS	OBS	[50]	50	50	50	50
000311	10	0	-10	-10	-10	10	+S	OBS	+S	-10	10	20
000312	30	30	30	20	30	30	-S	-S	[40]	50	50	70
000313	20	30	30	30	30	30	40	-	-	60	60	60
000314	30	30	40	40	40	40	40	[40]	40	40	30	20
000315	40	30	50	30	40	-30	20	[+S]	40	40	OBS	OBS
000316	0	-10	0	+S	+S	-100	OBS	[20]	40	OBS	OBS	OBS
000317	10	100	30	-110	-160	-50	-	OBS	+S	+S	OBS	OBS
000318	30	30	20	-10	20	30	40	[40]	40	40	50	50
000319	50	50	40	40	30	30	20	20	[30]	20	50	50
000320	50	40	40	40	40	40	40	-	-	40	40	50
000321	30	10	30	40	30	40	40	[40]	60	40	40	40
000322	40	50	40	40	50	50	50	[60]	50	50	50	50
000323	40	60	60	50	40	40	50	[70]	60	50	50	50
000324	50	50	40	30	30	30	50	[40]	70	70	70	80
000325	40	40	-10	0	-30	0	10	30	40	20	40	70
000326	30	40	120	150	90	120	130	120	50	50	60	60
000327	40	50	50	50	50	70	-	-	40	50	40	30
000328	OBS	20	30	30	40	40	[50]	40	30	-10	50	10
000329	30	20	30	40	40	40	[40]	40	50	50	50	50
000330	50	70	70	90	70	80	[60]	30	20	-10	-S	OBS
000331	50	50	50	50	50	50	[40]	20	0	10	10	0

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	-10	20	30	30	20	-90	-110	-100	-S	-S	-S	-
50	40	40	50	30	50	50	60	40	50	40	40	36
50	50	50	50	40	30	40	30	30	40	40	30	38
30	20	30	30	0	OBS	30	OBS	10	20	20	10	-
OBS	OBS	OBS	30	40	30	50	50	50	50	50	50	-
50	50	40	40	40	40	40	40	40	50	60	70	-
50	50	40	30	30	40	40	40	40	40	30	30	45
30	30	30	40	0	-10	-10	40	30	40	20	30	23
-10	-50	30	40	40	50	50	50	40	OBS	20	50	32
50	60	60	70	60	70	50	50	50	40	40	20	-
40	40	40	40	+S	OBS	-S	40	40	30	20	30	-
70	70	70	60	50	60	50	50	50	40	40	40	-
40	40	40	40	40	30	30	40	40	30	20	30	-
20	30	50	50	40	50	50	40	30	10	30	40	36
OBS	70	50	OBS	20	70	OBS	40	-20	30	20	0	-
OBS	OBS	OBS	50	50	60	70	70	50	40	50	40	-
80	80	OBS	+S	60	60	80	50	60	60	50	40	-
50	40	40	50	50	60	80	80	60	40	50	50	43
70	60	OBS	40	+S	40	OBS	OBS	50	0	60	60	-
50	50	50	50	50	70	70	70	60	50	50	50	-
50	80	60	70	60	60	50	50	50	50	50	40	46
70	80	80	80	70	50	40	30	30	40	40	40	51
50	40	40	40	40	30	50	40	40	30	40	40	46
80	80	80	70	60	60	70	70	70	70	50	40	59
70	50	40	30	40	40	30	50	50	40	30	30	31
60	50	50	40	40	+S	OBS	10	40	50	50	50	-
-S	OBS	40	50	50	40	70	70	60	60	50	0	-
30	40	40	40	40	30	30	40	40	30	40	30	33
10	30	10	20	40	20	-10	OBS	OBS	OBS	OBS	40	-
OBS	OBS	OBS	+S	OBS	OBS	OBS	-10	OBS	70	+S	OBS	-
10	30	20	20	30	0	10	10	10	10	20	20	24

Date	00	01	02	03	04	05	06	07	08	09	10	11
000401	20	10	10	30	30	40	40	40	50	60	[60]	70
000402	110	60	70	80	50	40	40	[50]	50	50	50	50
000403	20	20	20	20	30	40	-	(40)	50	50	50	40
000404	40	30	30	20	0	-20	[0]	30	50	50	50	40
000405	40	30	30	OBS	OBS	-S	-S	-S	-	-S	70	40
000406	40	30	30	40	40	40	[40]	40	40	30	30	40
000407	30	30	40	40	50	50	[50]	40	40	40	40	50
000408	40	40	40	50	50	40	[40]	40	40	30	30	30
000409	20	10	20	10	10	20	30	30	10	20	[20]	30
000410	10	20	10	20	20	40	-	(30)	30	40	30	40
000411	30	20	20	20	20	30	[40]	40	30	50	50	40
000412	30	30	30	30	20	30	[30]	40	30	30	30	30
000413	10	30	20	30	20	30	[40]	40	30	30	30	30
000414	30	30	10	20	20	30	[50]	30	30	40	40	30
000415	30	30	30	30	30	[30]	40	60	50	30	30	30
000416	OBS	-S	OBS	OBS	10	30	30	[30]	30	30	30	40
000417	30	30	30	30	30	30	-	-	60	60	60	50
000418	40	40	30	30	10	30	[20]	30	30	40	50	50
000419	20	0	10	20	30	-	-	-	-	-	-	-
000420	10	0	-10	-10	-10	0	-	-	-	-	-	-
000421	10	10	-40	-30	20	30	[30]	30	50	60	80	70
000422	30	20	20	20	20	20	40	40	[40]	50	60	50
000423	40	60	30	20	20	[40]	[40]	40	30	40	50	50
000424	30	30	30	30	20	30	[40]	30	40	40	40	50
000425	OBS	OBS	OBS	-20	-10	10	-	-	10	-	10	10
000426	20	30	20	20	30	40	[30]	30	30	40	40	40
000427	20	20	30	30	30	(40)	20	[30]	30	40	40	40
000428	20	20	20	20	20	30	[20]	20	40	40	40	40
000429	10	20	20	30	30	30	[40]	40	30	40	40	40
000430	10	OBS	30	20	20	30	30	[40]	40	50	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	50	40	0	+S	OBS	OBS	+S	-S	-S	-S	-S	-
50	40	40	40	40	50	40	40	40	50	40	20	50
30	40	40	40	40	50	50	50	50	40	40	40	-
40	40	50	40	40	40	40	50	50	50	40	50	35
50	50	-S	OBS	OBS	OBS	40	40	30	30	40	40	-
40	40	40	40	40	40	50	50	50	40	30	30	39
50	50	40	30	40	30	50	40	40	30	30	30	40
40	40	40	50	50	50	50	40	50	10	10	10	38
40	40	40	30	30	20	20	30	30	30	20	20	24
30	30	30	30	30	30	30	30	30	20	30	30	-
40	40	40	30	30	30	40	30	30	40	40	30	34
30	30	30	40	30	20	-20	30	40	30	20	10	27
30	30	30	30	30	30	30	30	30	30	30	30	29
40	30	30	30	30	30	30	30	30	30	30	30	30
30	20	30	30	30	30	40	40	40	40	50	30	35
40	30	40	30	30	30	30	30	30	30	30	30	-
40	40	50	40	50	40	30	40	40	40	40	40	-
40	50	50	50	50	30	20	20	20	20	10	10	32
-	-	-	-	40	40	30	20	30	20	10	10	-
-	-	-	70	60	50	40	30	20	30	0	0	-
70	80	80	70	80	80	40	40	40	40	30	30	42
60	60	60	50	40	20	30	30	30	30	30	40	37
50	50	60	50	40	40	30	40	40	40	30	30	40
50	50	40	30	30	30	20	10	0	10	0	OBS	30
20	30	40	40	40	40	30	30	30	30	20	20	-
40	50	50	50	50	40	40	40	30	30	20	20	35
40	40	50	40	40	30	30	40	40	30	20	20	33
40	40	40	40	30	30	30	30	20	20	20	10	28
40	50	50	50	50	40	40	30	30	20	-20	10	32
OBS	OBS	OBS	OBS	+S	30	30	40	20	10	10	10	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
000501	20	20	10	10	10	30	[50]	40	40	40	-40	40
000502	10	40	20	30	40	-30	--	-	30	30	30	40
000503	20	20	20	10	20	40	[40]	50	50	50	50	50
000504	30	20	10	20	10	10	[20]	30	30	30	30	30
000505	10	20	10	10	20	30	[30]	[20]	20	20	30	30
000506	10	10	10	20	20	40	40	30	30	[30]	30	30
000507	10	10	10	20	20	30	[30]	40	40	40	40	40
000508	10	10	10	10	10	20	-	-	30	30	20	20
000509	10	20	10	30	40	30	[30]	40	40	30	50	50
000510	10	30	30	30	20	40	[40]	40	40	40	50	50
000511	10	10	10	10	10	40	[40]	40	50	50	60	50
000512	10	10	10	10	10	30	[40]	50	50	70	70	60
000513	40	40	40	40	40	50	[50]	50	50	60	50	60
000514	30	40	30	30	30	40	40	40	[40]	50	60	70
000515	30	20	20	20	20	40	-	-	50	60	50	50
000516	20	30	30	20	30	30	[30]	30	20	40	40	40
000517	10	10	10	10	20	30	[20]	[20]	20	30	40	40
000518	30	10	30	20	20	30	[30]	20	30	30	40	40
000519	20	10	10	10	+S	30	[0]	-40	-90	-50	OBS	OBS
000520	10	10	10	20	10	-S	OBS	OBS	+S	40	60	30
000521	10	10	10	10	10	20	[20]	20	30	30	30	30
000522	30	30	20	20	30	30	-	-	OBS	-50	30	OBS
000523	10	20	20	20	30	30	[30]	10	30	10	10	0
000524	10	10	10	10	20	30	[30]	30	20	20	30	30
000525	20	10	10	10	10	20	[20]	20	20	40	40	40
000526	20	40	40	30	40	40	40	[40]	40	40	50	50
000527	30	30	10	20	20	30	[30]	40	30	30	30	40
000528	40	40	30	30	30	40	[40]	30	30	40	40	40
000529	40	10	10	OBS	OBS	10	+S	+S	50	20	OBS	-40
000530	0	10	10	20	30	40	[70]	70	-	80	50	40
000531	30	0	30	20	30	20	[30]	0	20	OBS	OBS	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	-S	OBS	OBS	OBS	OBS	+S	50	40	30	60	-
40	50	0	40	40	40	40	40	40	30	20	20	-
50	50	50	40	40	40	30	30	30	30	40	30	37
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30	30	30	20	30	30	30	30	30	30	30	30	-
50	40	90	40	50	40	40	30	30	20	20	20	35
60	70	OBS	+S	90	40	20	30	30	20	10	20	-
60	60	60	40	30	30	20	20	20	10	10	10	31
70	60	50	50	+S	OBS	-S	50	40	30	30	30	-
60	70	70	70	50	60	50	40	40	30	20	20	48
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50	50	50	40	40	40	-10	10	10	30	40	20	29
+S	30	30	40	20	30	30	30	30	10	10	20	-
10	40	40	40	40	20	10	10	20	20	10	10	-
30	30	30	30	30	40	40	30	30	30	40	30	26
20	80	30	10	30	20	30	20	20	20	10	10	-
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30	40	30	30	30	20	30	30	30	20	20	20	32
20	40	0	20	20	30	20	30	20	0	20	10	-
50	40	50	40	40	40	40	50	40	50	40	40	41
80	-20	30	30	40	30	40	40	50	40	40	40	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
000601	60	40	50	60	60	60	[60]	60	70	60	60	60
000602	20	20	20	10	20	30	[30]	40	30	30	40	40
000603	30	30	20	20	30	30	[40]	30	40	40	40	50
000604	20	10	10	20	10	20	20	[20]	20	30	40	40
000605	20	10	10	10	10	20	–	–	30	40	50	60
000606	20	10	20	30	40	40	[40]	30	40	50	50	+S
000607	30	30	20	20	20	20	[40]	30	30	30	30	40
000608	20	10	20	10	20	30	[40]	50	50	50	40	40
000609	10	10	10	10	20	30	[30]	20	20	40	40	40
000610	30	20	30	20	30	40	[30]	20	20	40	40	50
000611	30	30	20	30	20	20	[30]	20	30	40	50	50
000612	10	10	10	20	30	30	[40]	–	30	40	40	50
000613	20	20	20	20	10	20	–	–	–	–	50	70
000614	10	10	20	20	–S	40	[70]	90	80	60	60	70
000615	OBS	30	20	20	30	40	[20]	40	30	40	40	–S
000616	20	20	20	20	20	30	40	[40]	40	40	30	30
000617	20	20	20	20	20	30	[30]	30	40	40	40	30
000618	30	20	30	20	20	30	[30]	40	30	40	40	40
000619	30	20	20	10	20	30	–	–	30	40	40	40
000620	20	20	20	20	30	[30]	40	40	40	50	50	50
000621	30	20	20	20	30	[40]	30	40	40	50	70	70
000622	10	10	10	10	20	20	[30]	30	40	50	60	70
000623	20	10	20	20	30	[30]	30	40	40	40	40	40
000624	30	30	30	30	30	40	[30]	10	50	20	30	20
000625	–10	–10	10	20	–S	–S	–20	–30	20	20	30	40
000626	30	30	30	30	30	40	–	[30]	40	30	–S	–S
000627	30	20	20	20	30	[40]	40	40	40	40	40	50
000628	30	30	30	20	20	[30]	30	30	40	50	40	40
000629	30	20	20	20	20	[20]	30	30	30	40	40	40
000630	20	10	10	10	10	[30]	30	30	30	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	60	60	60	40	40	30	30	30	20	10	20	48
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60	60	70	70	50	40	40	30	30	30	30	30	39
50	60	50	60	50	40	20	20	20	20	30	30	30
60	60	50	50	40	40	40	30	30	30	30	20	—
OBS	OBS	OBS	—S	—S	OBS	OBS	OBS	—10	10	20	30	—
40	40	30	30	20	30	30	20	30	20	20	20	28
40	40	40	40	30	40	30	30	30	20	20	10	31
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60	50	50	50	40	50	50	40	40	40	30	20	37
60	70	60	60	60	50	40	30	30	20	20	20	36
80	80	OBS	OBS	OBS	OBS	OBS	—S	0	0	10	10	—
80	40	40	40	30	40	40	40	30	OBS	30	+S	—
40	40	40	50	40	30	40	30	30	30	20	40	—
40	30	—S	20	30	+S	40	40	40	40	40	30	—
40	40	40	40	50	60	60	50	40	40	40	40	37
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80	80	90	90	80	60	40	30	20	20	20	10	45
70	80	80	80	70	30	40	20	30	30	30	20	39
30	10	10	0	—10	OBS	0	—10	10	20	20	20	20
50	40	40	50	40	40	40	30	30	20	10	—50	29
30	30	30	30	30	30	40	40	30	30	30	40	—
40	40	30	40	40	40	40	40	30	30	30	30	—
50	50	50	50	50	50	50	40	50	40	40	40	40
40	40	40	40	40	40	50	50	40	40	30	30	36
40	50	50	40	30	+S	20	30	40	30	30	30	32
40	40	40	40	30	40	30	20	20	20	20	20	28

Date	00	01	02	03	04	05	06	07	08	09	10	11
000701	20	30	40	30	30	[30]	[40]	40	40	50	50	40
000702	30	20	10	10	10	10	20	[20]	20	30	40	40
000703	10	10	10	10	-S	20	-	-	30	40	40	40
000704	-	-	0	-10	0	[OBS]	-S	130	40	30	-	-
000705	10	10	10	10	10	30	30	40	[10]	30	30	30
000706	30	10	10	-10	-S	20	[20]	40	40	30	40	30
000707	20	20	10	10	10	20	[30]	20	-S	-10	30	40
000708	-	-	-	-	-	-	70	70	170	90	OBS	OBS
000709	30	20	40	20	20	30	[40]	[50]	50	40	30	-10
000710	30	30	30	30	30	40	-	-	50	50	40	40
000711	30	30	30	30	-S	40	OBS	+S	30	50	20	40
000712	-	-	-	-	-	-	OBS	OBS	+S	+S	80	130
000713	40	40	40	40	30	30	[30]	30	30	30	30	20
000714	10	20	10	10	20	30	[30]	30	30	40	40	40
000715	-20	0	10	10	-40	-60	[-20]	20	30	50	-80	-S
000716	30	30	30	30	30	40	[30]	[20]	40	40	40	30
000717	30	30	30	30	40	40	-	-	40	40	30	30
000718	30	30	30	30	40	40	[40]	40	40	OBS	OBS	OBS
000719	10	10	20	20	30	30	[70]	90	70	50	50	40
000720	30	30	20	20	30	40	[40]	30	40	40	30	30
000721	30	20	20	10	20	40	[40]	40	50	50	50	50
000722	20	20	20	20	10	30	[30]	30	30	40	50	40
000723	30	40	30	30	30	40	[40]	40	40	50	50	50
000724	20	10	10	10	30	20	-	-	40	50	50	60
000725	10	20	20	20	20	30	[30]	40	30	40	40	40
000726	10	10	10	10	10	30	[40]	30	30	50	30	OBS
000727	20	30	30	30	40	[40]	40	40	40	40	50	50
000728	10	20	10	10	10	20	30	30	[40]	[30]	30	30
000729	50	30	30	30	10	[30]	70	90	60	40	50	40
000730	30	20	20	20	20	30	30	[30]	30	30	30	40
000731	40	30	30	20	30	30	-	-	30	40	40	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	70	60	40	40	40	30	40	30	40	40	40
50	50	60	60	50	40	30	20	20	10	10	10	28
50	60	70	60	OBS	OBS	-	-	-	-	-	-	-
20	0	-	10	20	20	30	20	20	OBS	OBS	0	-
30	30	20	20	20	20	20	20	40	-S	10	+S	-
20	30	30	30	30	40	50	40	40	40	30	30	29
50	50	50	60	OBS	OBS	-	-	-	-	-	-	-
40	40	40	40	30	30	30	40	40	-20	-10	-30	-
-20	40	40	40	50	30	30	30	30	30	30	20	30
40	40	40	40	40	40	40	40	40	40	40	40	-
30	OBS	-	-	-	-	-	-	-	-	-	-	-
50	40	30	40	40	40	40	40	40	40	40	40	-
30	30	30	40	40	30	30	20	30	20	20	20	30
40	40	50	60	60	50	40	40	50	-S	-S	-20	-
OBS	30	20	20	30	40	30	30	30	40	20	20	-
-30	-10	-30	-60	40	20	40	20	20	30	20	30	20
30	40	40	30	40	50	50	40	40	40	30	40	-
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OBS	10	40	40	50	50	40	30	20	30	50	20	29
50	50	50	50	50	40	40	30	30	30	20	10	38
40	30	30	80	-S	OBS	OBS	-100	-30	10	30	40	-
40	30	40	10	40	40	40	40	30	30	20	20	38
30	30	40	40	40	40	50	50	50	40	40	40	34
40	50	50	40	50	50	50	40	40	50	40	30	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
000801	30	30	30	20	20	30	[40]	40	40	40	40	50
000802	10	10	10	10	20	20	[30]	30	30	40	40	40
000803	40	30	40	30	30	20	[30]	40	40	40	40	50
000804	30	30	30	30	40	40	[50]	40	40	40	40	40
000805	20	0	-S	20	20	40	[40]	OBS	OBS	OBS	OBS	OBS
000806	-	-	-	-	-	-	-	60	150	90	70	70
000807	30	30	30	30	40	50	-	-	30	30	30	40
000808	40	40	40	30	40	40	[10]	30	50	50	70	70
000809	10	30	30	40	30	40	[40]	40	50	50	50	50
000810	30	20	20	40	30	40	[40]	40	50	50	50	50
000811	20	10	20	20	20	30	[40]	40	50	50	50	+S
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000813	20	20	30	20	10	20	30	[40]	40	40	50	70
000814	30	30	20	20	20	30	-	-	50	40	50	60
000815	10	10	10	10	20	20	[30]	30	40	40	50	60
000816	10	10	10	10	20	30	[40]	40	40	40	50	60
000817	20	10	20	20	20	30	[40]	40	40	40	40	50
000818	30	30	30	20	20	30	[40]	40	40	30	40	50
000819	30	20	20	30	30	30	[30]	40	30	30	30	40
000820	20	20	20	10	20	30	40	[40]	40	40	50	60
000821	10	10	10	20	20	20	-	[40]	40	50	60	60
000822	30	0	-10	20	30	30	[40]	40	40	40	50	60
000823	30	20	10	20	20	30	[40]	40	40	40	40	40
000824	20	10	10	20	20	30	[30]	40	40	40	40	40
000825	20	10	20	30	30	30	[40]	30	30	30	30	40
000826	30	20	20	20	30	40	[50]	50	60	60	60	60
000827	30	10	10	10	20	20	30	[30]	30	30	40	40
000828	10	10	10	20	20	30	-	[30]	30	30	40	40
000829	30	30	20	20	20	30	[40]	40	30	40	40	50
000830	30	20	20	20	20	20	[30]	30	40	40	50	50
000831	-S	30	50	30	20	30	[50]	140	120	50	70	70

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	50	40	40	40	40	30	20	20	20	36
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50	60	60	60	50	40	30	40	30	30	30	20	39
40	50	50	50	40	40	40	30	30	30	30	20	38
+S	120	80	70	50	50	40	30	20	60	OBS	OBS	—
60	50	60	60	50	50	50	40	30	40	40	40	—
40	40	40	40	40	40	40	30	40	40	40	40	—
60	70	70	70	70	60	50	40	40	40	40	30	48
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50	50	50	50	40	40	40	40	30	20	20	20	38
+S	30	50	50	40	40	30	40	40	30	30	30	35
50	30	30	OBS	—S	+S	40	30	20	10	10	20	—
70	70	70	80	50	40	30	30	30	30	30	20	39
80	70	70	60	60	40	30	20	20	10	10	10	—
70	70	80	70	60	50	40	20	10	10	10	10	35
60	70	70	60	60	40	40	30	20	10	10	20	35
50	50	OBS	+S	40	+S	30	30	30	20	20	30	—
60	50	50	50	50	50	40	40	40	40	40	30	39
50	50	50	50	50	40	40	40	30	30	20	20	35
70	70	70	60	40	40	20	10	10	0	10	10	33
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50	60	60	50	50	40	40	40	30	30	30	20	35
30	40	30	30	30	40	40	40	30	40	30	20	31
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40	40	40	40	40	30	30	10	20	20	10	10	26
40	40	40	20	20	20	30	30	30	20	20	30	27
50	60	50	50	40	40	40	40	40	30	30	30	37
50	50	50	40	40	40	40	—20	0	30	30	20	31
50	50	80	50	70	OBS	OBS	OBS	OBS	—20	30	30	—

Date	00	01	02	03	04	05	06	07	08	09	10	11
000901	50	50	-50	-30	-70	-90	-30	[30]	70	70	70	50
000902	20	20	20	30	40	40	[50]	40	40	40	30	30
000903	10	20	20	20	30	20	40	[40]	50	40	30	30
000904	20	20	20	30	30	30	[40]	-	40	40	40	40
000905	30	30	30	40	40	40	-	-	-	50	40	30
000906	30	30	20	20	20	30	[40]	40	50	40	40	40
000907	20	30	-20	10	-30	-10	[-40]	10	40	50	60	40
000908	40	40	40	40	40	40	[50]	[50]	40	60	60	60
000909	40	30	30	40	40	[40]	40	50	50	50	60	60
000910	40	40	40	30	30	40	[50]	40	40	40	50	60
000911	30	20	20	30	30	30	[40]	-	50	60	70	80
000912	30	30	30	30	30	40	[40]	50	60	50	80	80
000913	20	30	30	20	20	30	[30]	40	40	50	50	60
000914	40	30	30	30	30	30	[40]	30	80	50	40	50
000915	30	30	20	20	20	30	[30]	30	40	40	40	40
000916	10	10	10	10	20	20	20	10	10	20	30	30
000917	-	-	-	-	-	-	30	30	40	50	40	70
000918	20	20	20	10	20	30	[40]	-	40	40	20	30
000919	30	30	20	20	20	10	[20]	30	30	30	40	40
000920	30	30	30	40	30	40	[40]	40	40	30	40	50
000921	40	40	40	40	40	30	[70]	30	30	30	30	30
000922	10	0	10	10	20	20	[30]	20	20	20	20	20
000923	40	40	40	40	40	50	[60]	50	50	60	60	70
000924	60	30	30	20	10	20	[30]	30	40	40	50	40
000925	30	30	30	20	30	40	[40]	-	30	30	30	30
000926	30	40	30	30	30	40	[50]	40	40	40	30	30
000927	30	30	40	30	30	20	[20]	20	30	30	30	30
000928	10	10	10	20	20	20	[20]	30	30	40	40	50
000929	30	30	20	20	30	30	[30]	30	30	30	30	50
000930	30	30	40	30	30	30	[30]	20	30	30	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	50	50	40	40	30	30	30	30	20	25
-S	30	10	+S	+S	OBS	-30	10	0	-30	+S	-S	-
30	30	40	30	30	30	30	30	20	20	30	10	28
40	40	40	40	40	40	30	30	30	30	40	40	34
30	30	40	40	40	40	40	30	10	30	30	30	-
40	50	60	40	40	30	40	30	30	20	10	20	34
40	OBS	-S	30	-20	40	20	30	40	40	40	40	-
60	80	80	70	60	50	70	60	50	50	40	40	53
70	80	70	70	70	50	60	50	50	40	40	40	51
60	70	70	60	50	50	50	40	40	40	30	40	46
80	80	80	80	70	60	50	40	40	40	40	40	50
80	80	70	60	50	50	50	40	30	40	30	30	48
60	60	50	60	+S	OBS	OBS	OBS	30	30	40	40	-
40	40	40	40	40	40	40	40	30	30	30	30	38
40	40	40	40	40	40	30	40	30	20	20	20	32
30	40	[30]	30	40	OBS	OBS	OBS	-	-	-	-	-
50	30	40	30	30	20	20	10	20	-20	-40	20	-
30	30	30	30	40	30	40	40	40	30	20	30	30
40	40	30	30	20	10	20	20	30	30	40	30	28
50	50	50	50	50	50	70	90	50	60	70	60	48
20	30	30	0	20	30	30	30	30	30	30	30	32
20	30	30	30	30	40	40	30	30	40	30	40	25
40	40	30	40	30	20	20	30	30	10	30	30	40
30	40	40	40	40	40	50	50	50	50	40	30	38
40	30	30	30	30	30	30	30	40	40	30	30	32
40	30	30	40	30	30	40	50	50	40	30	30	36
30	30	30	30	30	30	30	20	10	20	10	10	25
50	50	40	40	40	30	30	30	30	30	30	30	30
50	40	30	30	30	40	40	40	30	30	40	30	33
30	30	30	30	30	30	40	50	30	30	30	30	31

Date	00	01	02	03	04	05	06	07	08	09	10	11
001001	-40	-20	30	20	20	30	30	30	[40]	30	40	40
001002	OBS	0	30	30	30	20	[30]	-	30	40	30	30
001003	-S	-S	-S	-30	-30	-S	[0]	20	20	30	30	30
001004	20	20	20	20	20	20	[20]	60	70	70	70	60
001005	10	10	10	20	20	20	[20]	30	40	40	40	40
001006	10	10	10	10	10	20	[20]	20	20	20	20	20
001007	-S	-S	0	0	0	[-10]	-10	10	20	10	OBS	OBS
001008	20	20	0	-20	-S	OBS	OBS	-S	30	20	30	30
001009	10	10	10	10	0	10	-	-	-	20	20	20
001010	20	10	0	0	10	20	10	0	-10	[0]	10	10
001011	-180	-S	-40	0	10	10	[30]	40	30	40	40	40
001012	30	20	10	20	20	20	[30]	30	40	40	40	40
001013	20	-10	-10	10	20	10	[40]	30	40	40	40	40
001014	30	10	10	30	30	30	40	30	10	(30)	40	40
001015	30	40	20	30	40	60	[90]	90	40	40	60	60
001016	30	10	20	20	30	30	-	-	-	20	30	30
001017	40	40	40	30	20	[20]	40	40	40	40	50	50
001018	0	-	-	-	-	-	-	-	80	70	70	50
001019	20	20	20	20	20	20	[30]	30	40	40	40	30
001020	30	20	30	20	20	30	[30]	-	20	20	20	20
001021	0	10	10	10	20	30	40	30	40	40	40	50
001022	10	10	10	10	20	30	30	[20]	30	30	40	50
001023	30	30	30	20	20	20	[20]	20	10	10	20	30
001024	30	50	50	70	70	60	-	-	60	60	50	50
001025	40	30	30	30	30	40	[30]	30	40	40	40	40
001026	40	40	50	80	100	50	[90]	110	80	50	50	50
001027	30	0	30	30	-S	30	[30]	40	40	30	30	30
001028	10	10	10	30	20	20	40	30	40	50	40	50
001029	0	10	0	0	-10	-10	10	[10]	20	30	40	40
001030	40	50	50	40	40	40	40	-	-	20	-10	0
001031	10	10	10	10	0	0	10	-	10	20	30	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	30	30	30	40	-S	OBS	OBS	OBS	-20	60	100	-
40	50	50	50	40	40	60	30	30	20	+S	OBS	-
30	20	20	30	40	30	40	50	20	30	20	20	-
70	70	70	60	40	50	40	30	20	20	20	20	41
40	50	30	30	30	20	20	20	10	10	10	10	24
20	20	20	20	20	20	20	20	10	20	10	10	17
20	40	30	30	20	20	20	20	20	20	10	20	-
30	30	20	20	20	30	30	20	20	20	20	20	-
30	30	20	-50	-90	-50	-30	-S	-S	-S	30	30	-
20	30	40	40	40	40	30	30	30	30	-40	-60	13
40	60	60	40	40	40	40	40	40	40	30	30	23
40	40	40	40	30	30	20	10	20	0	-20	20	25
40	40	40	30	20	30	40	40	40	30	30	30	28
40	40	60	40	40	30	30	40	40	40	40	30	33
70	60	40	40	30	40	30	30	30	40	30	20	44
40	40	40	40	40	30	30	20	30	50	40	40	-
50	50	50	40	40	40	40	30	30	30	20	10	37
50	40	40	40	40	50	50	50	50	30	30	30	-
30	20	40	30	30	40	40	30	30	30	30	30	30
30	30	30	30	30	40	30	20	10	10	10	0	23
50	40	50	40	40	30	20	30	10	20	10	10	28
50	50	50	50	50	50	40	50	40	40	30	30	34
40	40	50	50	50	40	10	30	30	30	0	10	27
50	50	40	50	60	60	80	60	60	50	40	30	-
40	40	30	30	10	20	30	30	20	30	20	40	32
50	50	40	40	50	80	80	50	30	0	20	30	55
30	30	30	40	40	40	40	40	40	40	30	20	32
50	50	50	50	50	40	40	30	30	20	10	10	33
40	40	40	40	40	50	50	70	70	50	40	40	30
10	20	30	30	30	20	-10	-10	-10	-10	0	10	-
40	40	40	40	40	50	50	50	40	30	20	20	26

Date	00	01	02	03	04	05	06	07	08	09	10	11
001101	-10	10	OBS	OBS	OBS	-10	0	30	20	30	40	40
001102	50	50	50	50	70	-	-	-	+S	30	20	30
001103	20	30	30	30	20	20	30	[40]	30	30	30	30
001104	10	10	0	-40	-20	-20	0	[30]	20	10	10	-10
001105	20	30	30	20	30	20	10	30	[40]	60	40	30
001106	30	30	30	30	20	20	10	10	-	[30]	30	30
001107	40	40	30	20	0	-10	+S	OBS	[10]	0	20	10
001108	40	30	30	30	30	40	30	20	[30]	40	40	40
001109	10	10	30	10	20	30	40	40	50	40	50	40
001110	40	40	30	40	30	20	20	[40]	70	70	70	40
001111	40	30	40	40	30	40	40	[40]	60	60	40	40
001112	10	10	0	0	-10	0	0	0	[-20]	10	30	40
001113	40	40	60	70	70	80	80	-	-	80	60	50
001114	10	20	10	20	20	20	40	[30]	40	50	50	40
001115	30	30	20	10	20	30	+S	[+S]	-10	20	30	30
001116	50	-20	10	0	0	10	70	[30]	10	10	10	30
001117	30	20	30	30	30	50	70	[80]	80	60	50	40
001118	OBS	OBS	OBS	OBS	OBS	[-10]	0	30	-40	-S	-S	0
001119	40	40	40	40	40	40	40	[40]	60	60	50	40
001120	20	20	20	20	10	40	40	[50]	-	40	50	50
001121	30	40	40	30	30	30	40	[70]	50	40	40	40
001122	40	30	20	10	30	40	40	[60]	60	40	30	30
001123	0	10	10	10	30	40	70	[80]	40	20	30	30
001124	20	30	30	30	30	40	[10]	30	40	40	40	40
001125	40	40	40	40	40	40	40	[40]	50	40	40	30
001126	30	20	30	20	30	30	40	OBS	50	60	50	-S
001127	60	60	40	40	40	40	60	-	[50]	40	40	50
001128	40	30	40	40	40	50	60	[60]	50	60	50	50
001129	40	40	40	50	50	50	70	70	[60]	60	50	60
001130	-10	10	20	30	30	70	50	[60]	90	70	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
70	50	60	50	50	50	50	50	50	50	50	50	—
30	10	-30	-10	0	-10	-30	0	0	-10	-10	0	—
30	30	30	40	30	30	30	40	40	30	10	10	29
-10	0	10	20	OBS	-S	20	-50	OBS	0	0	10	—
40	30	40	40	40	40	50	40	50	50	40	30	35
30	40	30	40	50	40	50	40	30	40	60	50	34
30	40	40	30	40	40	40	50	50	50	40	40	—
50	40	40	40	40	60	50	60	60	60	40	30	40
40	40	40	60	60	70	80	80	70	80	90	60	48
40	40	30	50	40	40	40	40	50	70	50	50	44
40	40	40	40	40	30	40	40	10	-10	0	-10	33
40	40	40	40	40	50	40	40	40	10	20	30	21
60	70	60	40	40	40	40	40	40	40	30	20	—
40	40	50	40	40	30	20	20	30	40	40	30	32
50	40	40	40	30	60	40	40	30	30	+S	40	—
30	40	30	50	40	0	40	40	30	40	40	30	26
40	40	60	70	60	80	80	60	40	20	40	OBS	52
-30	20	30	40	30	30	40	40	50	50	40	40	—
40	30	30	30	20	30	30	20	-10	30	20	-20	33
60	60	40	40	50	60	70	40	30	30	30	40	40
40	40	40	50	50	30	40	70	30	40	40	30	41
30	40	40	30	50	80	30	0	10	-10	-10	10	30
30	40	40	40	40	30	40	40	40	30	20	10	32
30	30	30	20	40	60	60	50	30	70	60	60	38
10	30	-40	20	40	40	20	10	10	10	10	10	27
OBS	40	80	100	80	70	80	100	90	80	70	60	—
40	40	50	50	60	70	70	70	60	40	50	40	50
50	50	50	50	50	50	50	40	30	40	40	30	46
50	60	50	50	60	70	70	50	30	20	20	10	49
60	50	60	60	70	80	80	80	80	90	70	50	57

Date	00	01	02	03	04	05	06	07	08	09	10	11
001201	60	70	120	90	120	110	120	[130]	70	30	30	20
001202	50	40	30	30	30	20	10	[10]	[20]	-10	-10	30
001203	10	30	30	40	30	30	[50]	60	30	20	20	30
001204	70	40	30	30	30	20	20	-	-	30	20	30
001205	30	30	20	30	20	30	[20]	10	30	20	30	40
001206	0	0	0	10	0	0	[0]	0	-10	-10	-10	-20
001207	10	10	10	10	0	0	10	[10]	10	20	30	20
001208	0	0	0	0	0	0	10	[30]	40	50	50	50
001209	50	50	40	50	60	50	[50]	[70]	70	40	50	50
001210	40	60	40	40	40	50	50	50	50	[40]	70	50
001211	10	10	20	+S	+S	-S	OBS	-	-	30	50	60
001212	30	40	50	50	40	50	70	70	[100]	110	70	80
001213	70	40	50	60	80	100	80	80	[40]	40	50	60
001214	30	30	40	30	40	40	30	[40]	50	50	70	70
001215	90	80	70	70	60	50	50	30	OBS	OBS	+S	OBS
001216	20	20	20	20	20	20	30	[40]	40	40	40	30
001217	20	20	20	20	20	20	30	30	[40]	40	50	40
001218	40	30	20	OBS	40	30	30	-	-	60	60	70
001219	50	50	40	50	50	60	50	70	[80]	[90]	60	80
001220	40	50	60	70	70	80	70	[70]	90	80	80	80
001221	30	30	10	-10	-10	10	10	[20]	20	10	10	20
001222	40	30	40	30	30	30	30	[40]	[40]	40	50	40
001223	10	0	-10	-10	-30	-50	-50	[-50]	-40	-30	-20	0
001224	60	60	60	60	50	40	80	[110]	110	100	90	70
001225	30	40	70	30	40	30	[40]	[40]	40	40	50	30
001226	60	60	40	40	-	-	-	-	-	-	-	-
001227	50	50	10	10	-	-	50	70	[40]	60	40	30
001228	50	40	50	60	70	60	-	-	-	-	-	-
001229	30	30	20	30	30	30	30	[30]	30	50	70	60
001230	+S	OBS	-	40	30	40	40	-	-	70	70	80
001231	40	30	40	40	20	30	30	[30]	[40]	50	50	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
10	30	40	40	30	0	20	20	20	0	20	30	51
20	30	[30]	50	40	30	20	30	20	70	40	10	27
40	40	30	30	50	50	70	30	50	30	20	70	37
10	-10	-10	30	20	0	0	30	10	-10	30	30	-
30	30	30	40	30	20	30	20	40	40	20	0	27
-20	-20	-10	-10	0	-10	0	0	0	0	0	10	-4
20	30	30	30	30	20	20	10	10	10	0	10	15
70	70	80	80	70	80	80	80	80	70	30	30	44
40	30	60	40	40	40	60	50	30	20	10	30	45
60	60	40	30	40	40	20	20	40	30	30	30	43
30	30	30	30	40	30	40	30	30	30	30	30	-
70	70	70	60	60	70	60	70	60	40	70	60	63
60	50	50	50	50	50	40	50	40	50	50	40	55
70	50	40	40	50	50	50	50	60	60	70	70	49
30	+S	50	40	40	50	50	40	40	30	30	30	-
30	40	40	30	40	30	40	40	40	30	30	20	31
40	40	50	70	70	80	70	60	OBS	40	70	50	43
50	60	70	80	100	50	60	70	70	60	60	50	-
50	40	40	130	160	80	40	30	30	30	40	30	60
70	70	70	70	80	90	90	80	60	60	50	60	70
10	20	30	40	40	50	60	60	50	50	40	40	27
50	50	60	60	70	30	10	20	10	20	10	10	35
10	20	30	-10	-20	0	20	20	30	30	30	70	-2
40	40	40	40	70	50	100	130	90	80	30	30	68
10	10	30	20	40	40	40	50	30	50	60	60	38
-	-	-	-	70	70	40	30	30	0	30	80	-
70	60	40	20	30	40	80	80	30	20	20	30	-
50	40	40	70	70	80	90	90	100	80	60	50	-
70	70	50	70	100	100	90	60	40	40	90	70	54
40	60	70	50	80	80	70	60	80	70	80	80	-
50	50	40	50	80	90	80	40	100	100	80	70	53

*Hourly means of the
2001*

Date	00	01	02	03	04	05	06	07	08	09	10	11
010101	80	50	50	40	30	50	30	–	60	70	60	70
010102	–30	–30	–20	–30	–40	–40	–30	–	–	10	0	20
010103	30	60	40	30	40	30	50	70	[70]	60	40	30
010104	80	70	40	50	70	80	80	[30]	10	–40	–40	–40
010105	20	10	60	70	80	80	80	70	110	80	80	30
010106	40	40	40	30	30	30	40	[40]	60	70	70	60
010107	30	40	40	20	10	20	20	[20]	20	20	20	20
010108	20	30	40	30	20	20	10	–	20	30	30	10
010109	10	–10	–10	–10	10	10	30	–	–	30	30	40
010110	50	50	40	40	40	50	70	[80]	70	70	80	90
010111	80	90	80	50	–10	30	70	[80]	80	30	40	50
010112	20	30	30	30	40	70	70	[60]	70	60	80	70
010113	50	60	70	60	50	40	40	[40]	50	50	60	60
010114	30	30	30	20	50	40	60	[30]	40	80	70	70
010115	60	70	50	50	60	60	60	–	–	70	7	70
010116	50	70	40	40	50	60	80	[70]	60	60	60	60
010117	0	–20	–20	–20	–30	–40	–10	[–10]	–30	–20	–10	–10
010118	–10	0	–10	–10	–10	–30	–20	[–30]	40	–50	–50	–40
010119	–30	30	30	10	–40	–70	–80	[–70]	–40	–30	–50	–80
010120	20	30	0	20	20	30	–10	0	20	10	[10]	–10
010121	40	20	30	20	–30	–30	0	[0]	30	20	20	30
010122	–40	–40	–50	–50	–50	–50	–50	–	–	–50	–60	–50
010123	–10	–20	–10	–20	–20	–20	–30	[–30]	–40	–30	–30	0
010124	–20	–30	–20	–30	–20	–20	–10	[0]	10	10	10	10
010125	–20	–20	–40	–10	–S	OBS	50	40	20	40	30	10
010126	–10	–20	0	30	30	40	70	[80]	80	50	70	80
010127	10	–20	–10	–10	0	10	20	0	10	30	40	60
010128	30	20	10	20	30	20	30	[40]	40	50	40	40
010129	2	10	10	20	30	40	50	–	–	60	40	40
010130	30	30	20	40	40	40	20	[20]	30	20	70	0
010131	30	10	10	20	30	20	10	0	10	10	20	30

potential gradient

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	60	50	40	30	20	-20	-10	-30	-40	-50	-40	29
30	20	20	30	70	60	70	80	80	60	40	30	-
70	50	30	40	70	80	30	40	70	50	70	40	50
0	-10	-20	-30	-40	0	10	30	70	60	50	40	23
10	-10	-20	-10	10	20	40	50	40	40	40	40	43
70	70	60	70	110	90	90	100	80	80	90	70	64
20	30	20	30	40	40	40	50	60	40	40	30	30
10	20	20	-10	OBS	OBS	20	20	10	10	20	10	-
50	50	50	60	80	80	90	80	80	80	80	60	-
90	90	80	80	90	90	100	100	90	80	70	80	74
70	80	30	40	50	50	50	50	60	50	40	30	53
80	80	80	80	70	60	50	70	80	80	70	50	62
60	70	70	50	60	50	40	40	50	40	30	30	51
70	80	80	80	80	80	90	80	80	80	70	60	62
70	80	80	80	80	80	90	80	70	50	60	60	-
30	-10	-10	30	20	30	10	10	0	-10	-10	-10	33
-20	-20	-10	-10	0	0	0	0	-40	-10	-10	-10	-15
-40	-50	-30	10	30	30	30	0	-40	-10	-50	-50	-20
-40	-50	-20	-10	20	40	20	0	-10	-10	-10	10	-20
20	30	30	20	30	-10	0	-10	-10	-30	-30	20	8
30	40	30	40	40	30	30	40	20	10	10	-10	19
-60	-50	-60	-60	-50	-60	-60	-50	-20	-20	-30	-10	-
20	30	80	70	90	80	80	80	70	40	40	20	18
10	0	-10	-10	-20	-20	-20	-10	-20	-30	-20	-10	-11
10	30	20	20	-20	-	-20	10	-10	10	-20	30	-
80	70	60	70	70	80	60	90	130	120	80	20	60
50	50	20	70	40	10	-10	30	10	30	30	30	21
40	40	50	50	60	50	50	60	40	40	30	30	38
40	40	40	60	70	70	60	60	80	60	50	30	-
-10	0	-10	0	10	10	0	10	-10	0	10	10	16
30	40	0	0	-10	10	10	10	10	-20	-10	0	11

Date	00	01	02	03	04	05	06	07	08	09	10	11
010201	0	0	0	0	0	20	30	[30]	30	40	40	50
010202	20	10	20	30	30	30	30	[30]	OBS	-S	10	30
010203	20	-20	0	30	30	40	40	[40]	50	60	50	30
010204	50	40	30	60	60	40	40	[40]	70	60	70	30
010205	60	50	50	40	60	60	70	-	[70]	60	50	60
010206	30	30	30	40	40	40	70	[70]	90	90	7	70
010207	10	0	10	10	10	30	40	[40]	60	60	60	70
010208	40	40	30	40	50	30	30	[40]	40	40	40	40
010209	30	30	0	10	20	20	10	[20]	40	50	50	40
010210	0	20	30	30	20	30	30	[30]	40	40	40	40
010211	40	40	40	40	30	40	40	50	[60]	60	50	50
010212	50	30	40	70	70	70	80	-	[80]	100	80	70
010213	30	40	40	40	40	50	40	[40]	70	70	70	70
010214	30	20	20	20	30	30	30	[40]	40	40	40	70
010215	40	40	40	40	30	30	40	[40]	40	40	50	60
010216	50	40	30	50	50	60	50	[50]	70	70	60	80
010217	50	50	50	40	40	40	50	[40]	40	40	40	40
010218	20	30	30	40	30	30	10	[30]	30	0	20	40
010219	10	20	20	30	30	30	40	-	-	-	30	40
010220	10	10	10	10	10	20	30	[20]	20	20	-10	-S
010221	30	30	40	30	10	20	10	[20]	30	40	30	40
010222	OBS	OBS	20	20	20	20	20	[30]	20	30	30	30
010223	20	OBS	OBS	OBS	OBS	OBS	20	[30]	10	30	OBS	OBS
010224	70	50	50	40	40	30	40	[40]	60	60	50	60
010225	70	60	40	40	50	40	40	60	[60]	60	50	60
010226	30	30	30	40	30	30	50	-	-	70	50	70
010227	40	40	40	30	40	40	50	[50]	70	60	50	50
010228	0	10	0	0	0	-30	-30	[-30]	10	50	60	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	40	50	50	50	50	50	50	50	20	10	20	30
40	-S	50	40	40	50	50	60	60	50	30	10	-
40	40	0	0	30	30	30	40	40	40	50	40	31
30	50	30	50	30	30	30	60	60	60	40	50	46
50	40	40	OBS	60	30	0	0	10	10	20	30	42
70	60	50	60	50	50	40	40	30	-20	0	0	46
60	70	50	50	40	60	50	50	60	40	40	40	42
40	40	30	30	30	30	30	30	20	0	-10	-10	30
50	50	60	50	50	40	40	10	20	-20	10	0	28
40	40	50	50	50	60	60	70	60	50	50	40	40
50	60	50	50	40	50	60	40	30	30	30	40	45
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70	70	70	30	30	40	40	40	50	50	40	40	49
70	70	60	70	70	50	40	40	30	30	30	20	41
70	60	50	30	30	40	40	70	70	50	40	50	45
90	90	60	50	50	60	40	40	40	80	70	50	58
30	30	30	20	10	30	40	30	20	10	-10	0	32
40	30	40	30	20	10	30	30	20	20	20	10	25
40	40	30	10	10	30	30	30	20	10	20	30	-
30	+S	-S	40	30	60	-40	40	90	40	20	30	-
50	50	40	40	40	40	40	40	30	40	30	OBS	33
30	30	40	40	40	40	40	40	30	30	20	20	-
OBS	+S	OBS	OBS	OBS	40	40	OBS	OBS	40	40	40	-
60	70	80	60	50	50	60	80	70	70	40	60	56
50	60	60	40	30	30	40	40	50	40	30	30	47
60	50	40	30	40	60	60	50	50	40	40	30	-
50	40	40	40	40	30	30	40	40	30	30	10	41
50	50	50	50	-20	-30	OBS	OBS	OBS	OBS	-S	-10	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
010301	-10	-10	-10	0	10	-20	-10	[0]	20	30	40	50
010302	80	170	70	-	-	70	30	[50]	4	50	50	60
010303	-S	-S	-S	-20	30	100	120	160	130	70	50	50
001034	40	60	50	40	20	10	10	[10]	10	30	50	50
010305	40	30	30	20	30	-10	20	-	-	40	40	40
010306	40	40	40	40	40	40	50	[50]	50	50	50	50
010307	40	40	20	30	20	10	20	[30]	40	50	50	50
010308	-10	-10	-10	-20	-30	-20	-30	[0]	0	10	30	40
010309	40	30	30	40	30	40	40	[40]	40	50	50	50
010310	30	0	0	20	-	-	-	-	-	40	40	50
010311	50	50	60	50	30	30	40	[40]	40	40	30	40
010312	40	30	30	30	30	30	20	[50]	-	50	60	60
010313	20	30	20	30	20	30	-10	[-20]	-S	-S	-S	-10
010314	30	30	30	20	30	30	40	50	[40]	40	30	40
010315	30	30	30	30	30	40	40	[40]	30	40	40	30
010316	-10	0	20	40	40	30	30	[40]	40	40	40	50
010317	30	30	40	20	10	20	20	[30]	50	50	50	40
010318	20	10	10	10	10	10	10	20	[30]	40	40	40
010319	30	30	20	30	40	30	40	[50]	-	60	50	+S
010320	30	30	40	40	40	40	50	[50]	60	60	50	50
010321	50	40	50	40	60	70	-	-	-	-	-	60
010322	40	20	30	30	60	30	20	10	20	20	+S	OBS
010323	OBS	OBS	0	30	30	30	40	[40]	[50]	50	50	50
010324	120	120	110	50	30	20	+S	[+S]	30	-20	40	60
010325	70	30	30	20	10	20	10	[50]	60	50	50	40
010326	-	-	-	-	-	50	-	-	30	40	70	60
010327	30	30	50	40	70	6	[60]	40	30	50	70	70
010328	50	30	30	30	30	40	[60]	[60]	60	50	50	40
010329	0	-10	10	20	-10	-10	-10	[10]	0	-10	-10	-20
010330	-30	-30	-30	-20	-10	20	[0]	10	30	30	40	40
010331	30	20	30	40	40	40	[60]	70	40	50	50	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	40	40	40	30	50	40	30	30	30	70	80	26
-S	10	40	40	30	30	40	50	30	30	30	-S	-
40	50	50	50	60	50	50	50	60	70	50	50	-
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50	50	50	50	50	50	60	60	50	40	50	30	47
50	50	50	40	40	40	50	50	30	0	-10	0	33
40	40	40	50	40	40	30	30	10	10	10	30	13
50	50	50	40	40	30	40	20	30	30	0	30	37
50	50	50	50	50	60	50	50	60	70	70	60	-
40	40	40	20	OBS	OBS	20	50	70	70	70	50	-
60	60	60	50	50	50	50	40	30	30	10	0	40
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40	40	40	40	40	40	40	40	50	30	30	30	36
40	50	50	50	40	50	60	OBS	-S	30	10	-10	-
50	50	50	50	40	30	40	60	50	50	70	40	39
40	40	20	-10	30	30	40	30	30	40	40	-S	31
40	40	40	40	10	30	30	30	40	40	40	40	28
OBS	-30	OBS	OBS	OBS	130	-S	50	40	40	40	30	-
50	50	40	30	30	30	50	60	50	40	30	40	43
50	50	30	40	70	60	70	30	20	20	30	60	-
-	+S	+S	30	OBS	70	80	90	100	100	140	120	-
50	40	20	OBS	OBS	OBS	-S	10	30	30	60	70	-
50	50	50	40	40	40	40	60	70	50	70	80	-
0	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	-	-	-
60	60	50	60	70	80	70	40	50	70	60	40	-
70	50	50	50	50	50	50	50	40	60	50	70	52
40	40	60	50	60	50	50	50	30	20	10	0	41
-10	20	30	0	-10	10	0	10	-10	-10	0	-10	-1
40	50	40	40	30	20	30	20	0	0	20	30	15
60	70	70	70	70	60	50	50	40	40	40	40	50

Date	00	01	02	03	04	05	06	07	08	09	10	11
010401	40	40	30	30	30	30	30	[70]	70	80	60	60
010402	20	30	30	30	20	30	-	-	40	50	50	50
010403	30	30	30	30	30	40	[40]	40	40	40	50	50
010404	10	20	30	20	20	30	[40]	30	40	40	50	50
010405	30	30	30	30	20	3	30	[-20]	30	30	30	40
010406	30	20	20	20	30	30	[50]	50	40	40	40	40
010407	30	20	20	10	20	30	[30]	30	30	40	30	30
010408	-10	-S	-S	-S	-S	-S	OBS	-S	-S	-S	-	-30
010409	40	30	30	20	30	30	[30]	-	30	30	30	30
010410	40	30	40	30	40	40	[60]	[70]	70	70	70	80
010411	40	30	30	10	10	20	[10]	60	40	40	30	20
010412	30	20	20	20	20	20	[20]	20	20	30	20	30
010413	30	OBS	20	OBS	40	30	-S	OBS	40	40	40	70
010414	40	30	40	40	30	30	[40]	40	40	40	OBS	-S
010415	40	30	30	30	30	[30]	40	40	30	30	20	30
010416	40	40	30	30	40	[40]	[60]	40	40	50	40	40
010417	30	30	30	30	40	40	-	-	-	50	40	40
010418	40	30	30	30	30	40	40	[40]	40	40	40	30
010419	60	40	30	30	30	30	30	[40]	30	30	20	30
010420	20	30	30	30	OBS	20	30	[30]	[80]	110	70	30
010421	0	-10	-30	0	-30	10	10	[30]	[20]	50	50	30
010422	40	40	40	40	40	40	40	40	[40]	50	40	20
010423	30	40	40	30	30	40	40	[40]	-	40	50	40
010424	60	50	50	40	40	40	40	[40]	40	40	40	40
010425	40	30	20	20	30	30	40	[40]	30	40	40	40
010426	10	20	10	20	-S	-S	[30]	30	30	20	30	20
010427	30	30	30	20	20	20	30	[40]	30	20	10	20
010428	30	20	30	20	20	30	40	[30]	40	40	40	40
010429	20	20	20	10	10	10	20	30	[30]	30	40	30
010430	10	10	20	10	20	20	-	-	30	30	40	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
60	60	70	70	70	60	80	50	40	40	30	20	51
50	50	50	50	50	40	40	40	30	40	40	30	–
50	40	40	40	40	30	40	30	20	30	20	20	35
50	50	50	40	40	40	40	40	40	30	20	20	35
40	50	40	40	40	40	50	50	40	50	40	40	35
30	30	30	40	40	50	40	40	60	50	30	30	37
30	30	20	0	–20	10	20	0	20	20	30	–60	18
–10	20	–20	10	20	30	30	30	40	40	30	40	–
40	40	30	40	40	30	50	40	40	40	40	40	35
80	80	60	50	40	40	50	60	40	40	40	40	53
30	40	40	30	20	10	10	10	10	10	30	20	25
30	40	40	30	40	40	40	20	30	30	30	30	28
+S	–S	OBS	40	–S	–S	30	30	40	30	40	30	–
+S	90	–S	–S	OBS	40	40	60	50	50	40	40	–
20	20	30	20	20	20	20	10	20	20	30	40	27
40	40	30	30	40	+S	OBS	–S	20	30	30	40	–
40	40	40	40	40	40	40	50	50	50	40	50	–
30	40	30	40	40	30	30	40	40	40	40	40	36
30	30	0	–10	OBS	OBS	OBS	OBS	OBS	OBS	OBS	10	–
30	30	30	40	40	40	40	40	40	50	60	20	40
10	10	10	20	20	30	30	30	30	70	60	40	20
10	10	–20	10	20	20	10	30	40	40	30	30	29
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40	40	50	50	50	50	50	50	50	50	50	50	46
40	40	50	50	40	40	30	40	40	40	20	20	35
OBS	30	40	30	30	40	40	40	30	40	30	30	–
30	30	30	40	30	30	30	30	30	30	30	20	28
40	40	30	30	0	20	30	30	40	30	20	20	30
40	40	40	40	40	40	30	20	20	20	20	10	26
50	50	40	40	40	40	40	40	30	30	20	30	–

Date	00	01	02	03	04	05	06	07	08	09	10	11
010501	20	20	20	10	10	20	20	[20]	30	30	40	40
010502	20	20	20	10	10	20	40	[30]	–	40	50	50
010503	20	10	10	10	10	10	30	40	[30]	30	30	40
010504	30	30	20	20	20	30	40	[30]	30	40	40	40
010505	OBS	+S	+S	40	20	10	10	[30]	[120]	40	30	30
010506	30	30	30	40	30	20	OBS	OBS	OBS	OBS	30	20
010507	–10	–10	–10	–10	0	10	0	–	–	10	10	20
010508	OBS	OBS	OBS	–20	–10	–10	–40	10	[30]	30	30	30
010509	30	30	30	30	30	30	30	[30]	30	20	10	30
010510	30	20	20	20	20	20	30	[30]	30	30	30	30
010511	20	10	10	20	10	20	30	[30]	30	30	30	20
010512	50	40	50	50	30	30	30	[30]	30	30	30	30
010513	30	30	30	20	30	20	30	30	[40]	30	30	30
010514	20	10	10	20	10	10	10	–	–	0	–10	10
010515	20	20	20	20	10	20	20	[20]	[20]	30	30	30
010516	30	20	20	10	0	0	30	[40]	40	40	40	40
010517	20	10	0	30	30	30	[40]	40	40	50	50	40
010518	20	20	20	20	30	20	30	[+S]	40	20	20	20
010519	30	30	30	30	30	20	[30]	50	40	40	30	20
010520	20	10	10	20	20	10	30	[30]	30	30	30	30
010521	10	20	20	30	30	30	40	[40]	40	40	40	50
010522	30	40	30	30	30	20	[10]	20	30	40	50	50
010523	40	40	30	30	30	30	[30]	[20]	30	30	30	40
010524	10	20	10	10	30	30	[30]	30	40	50	50	40
010525	10	20	20	20	30	30	[40]	40	40	40	50	50
010526	30	20	30	30	30	40	50	[60]	70	60	50	50
010527	10	20	10	20	30	30	30	[30]	40	40	40	30
010528	10	10	10	–	–	–	–	–	60	50	40	20
010529	10	10	20	20	20	30	50	[40]	+S	40	40	40
010530	30	30	30	30	20	40	[40]	40	40	60	50	50
010531	20	10	10	10	10	20	[30]	20	20	30	OBS	OBS

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	50	50	40	40	40	30	30	20	20	20	29
50	50	50	50	40	40	40	40	40	30	30	20	34
40	40	40	40	40	40	40	30	20	20	20	20	28
40	50	OBS	OBS	-S	OBS	OBS	OBS	30	40	-S	OBS	-
40	50	50	-S	40	40	40	40	40	30	30	30	-
10	10	10	10	10	10	10	10	0	-10	0	-10	-
10	-10	-10	-10	-10	-10	10	0	-20	-10	0	10	-
20	30	30	30	30	30	30	30	30	30	30	30	-
30	30	30	30	30	30	20	20	20	30	30	30	28
30	30	30	30	30	30	30	30	30	30	30	20	28
30	30	OBS	20	20	30	OBS	10	30	50	50	40	-
30	30	30	30	30	20	20	30	40	40	30	30	33
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40	30	40	40	30	30	30	30	30	30	30	20	27
40	OBS	30	30	30	20	30	30	30	30	20	20	27
40	40	40	40	40	40	40	40	40	30	30	30	35
40	30	30	OBS	OBS	OBS	-S	OBS	OBS	10	30	30	-
20	20	30	20	30	30	30	20	30	20	20	30	28
30	40	40	40	50	40	30	20	20	30	20	10	27
50	40	40	40	50	50	40	40	40	30	30	40	37
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40	40	30	30	20	30	30	30	+S	30	10	10	-
40	50	50	40	40	40	40	30	30	30	40	30	34
50	60	60	70	50	50	50	50	40	30	20	20	42
30	40	OBS	OBS	40	30	30	20	-10	OBS	10	20	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
010601	30	30	30	30	40	40	[60]	40	40	30	0	-10
010602	30	30	20	20	20	20	[20]	30	30	20	40	30
010603	20	10	30	30	30	30	40	[40]	30	+S	OBS	-S
010604	10	20	20	20	30	30	[40]	40	40	30	40	30
010605	30	30	30	30	40	40	-	-	30	40	40	40
010606	10	10	10	20	30	30	[20]	20	20	30	40	40
010607	20	20	10	10	10	20	[40]	40	40	40	40	40
010608	20	20	10	10	10	20	[30]	30	30	30	40	30
010609	10	10	10	10	0	-10	[10]	10	20	20	30	10
010610	40	30	30	20	20	20	30	[30]	30	30	20	30
010611	+S	20	30	20	10	30	[20]	-	30	10	OBS	OBS
010612	20	10	20	30	20	30	30	40	[30]	-	30	30
010613	20	30	30	20	30	30	[30]	30	30	30	40	40
010614	20	30	20	20	20	20	[30]	30	30	40	40	30
010615	20	10	10	10	20	20	20	30	[30]	(40)	50	40
010616	20	10	10	20	10	30	[30]	20	30	30	40	40
010617	30	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS
010618	20	10	10	10	20	40	[50]	-	40	30	30	30
010619	10	10	10	10	20	20	[30]	20	20	30	30	20
010620	10	0	0	0	20	0	0	[10]	10	90	0	0
010621	10	20	30	30	40	80	[80]	70	70	70	40	40
010622	10	10	30	OBS	-10	30	80	[40]	70	40	+S	OBS
010623	20	30	20	20	20	20	[30]	30	30	30	30	30
010624	30	30	30	20	30	30	30	[30]	30	30	30	30
010625	20	20	10	20	30	40	-	-	40	50	50	50
010626	30	30	40	20	30	40	[40]	40	40	40	50	50
010627	30	20	20	20	20	30	[30]	30	40	50	60	60
010628	30	20	20	10	20	20	[30]	30	40	40	40	40
010629	40	40	30	30	50	50	[40]	40	30	40	30	30
010630	20	20	20	20	20	[20]	[30]	20	30	40	40	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
30	OBS	30	40	40	40	40	40	30	30	30	30	32
30	30	30	40	40	40	30	30	40	30	30	30	30
OBS	OBS	+S	OBS	OBS	OBS	-S	30	20	-20	-10	10	-
20	20	20	10	20	30	40	40	40	40	40	30	29
50	40	50	50	40	40	30	30	30	30	20	20	-
50	50	50	50	30	30	20	20	30	30	30	30	29
50	50	50	60	50	40	40	50	40	30	20	20	35
30	-S	OBS	30	+S	30	-S	+S	30	40	30	30	-
20	30	30	40	40	40	40	40	60	40	30	30	24
40	40	30	30	30	20	10	10	20	20	+S	20	26
OBS	10	10	80	10	10	10	20	20	10	10	10	-
30	30	30	30	30	30	30	30	30	30	30	30	28
40	40	40	40	40	40	30	30	30	30	30	20	32
40	30	30	30	30	30	30	40	40	40	30	20	30
50	50	50	60	40	30	20	30	20	10	20	10	28
40	30	30	30	30	30	40	30	30	70	OBS	30	30
OBS	OBS	50	80	50	30	30	20	20	10	20	20	-
20	30	30	10	10	20	20	30	50	20	20	20	25
10	30	30	30	30	20	20	20	10	0	0	0	18
10	0	90	30	30	20	10	20	-S	OBS	10	10	-
40	60	60	60	60	40	30	30	20	20	10	10	43
OBS	10	10	30	20	20	30	40	40	30	30	20	-
40	40	40	40	40	40	30	30	30	30	30	30	30
30	40	40	40	30	40	30	30	30	30	20	20	30
50	50	50	50	40	50	50	40	30	30	30	30	-
60	60	60	70	60	40	30	20	20	10	20	20	38
70	80	80	80	70	50	40	40	40	30	20	30	43
40	+S	OBS	OBS	20	30	30	30	10	20	20	30	-
40	40	40	40	30	30	30	30	30	30	30	20	35
60	50	50	60	60	50	40	30	30	30	20	30	35

Date	00	01	02	03	04	05	06	07	08	09	10	11
010701	10	10	0	10	20	10	30	20	[30]	10	10	10
010702	20	30	20	10	20	20	–	–	30	40	40	40
010703	40	30	30	30	30	40	[40]	30	40	40	40	40
010704	OBS	30	30	0	10	20	[70]	80	50	80	40	30
010705	20	30	20	30	50	60	[50]	70	70	60	60	50
010706	30	30	30	40	40	40	30	[10]	10	30	30	30
010707	10	10	10	10	10	10	10	[10]	10	10	10	20
010708	–S	–S	10	10	10	10	[30]	40	40	40	40	40
010709	30	20	20	30	30	30	–	–	30	30	40	30
010710	20	20	20	10	20	30	[30]	30	30	40	40	40
010711	30	20	30	10	10	10	20	20	20	30	40	40
010712	0	–10	30	10	10	30	40	[40]	50	40	50	30
010713	40	40	40	40	20	30	40	[40]	40	40	40	40
010714	30	30	20	20	20	20	40	[30]	20	40	40	40
010715	30	30	40	40	40	40	50	[40]	[40]	40	40	40
010716	20	20	20	20	20	[30]	30	–	30	30	40	40
010717	10	10	10	10	10	30	OBS	OBS	OBS	–10	0	0
010718	10	10	20	20	20	40	[60]	60	50	50	50	50
010719	30	30	20	30	20	40	[70]	[90]	70	50	50	40
010720	30	30	[20]	20	20	110	120	100	60	70	40	40
010721	40	30	30	40	40	40	[20]	30	–20	30	40	30
010722	40	30	20	10	20	20	40	[40]	60	40	40	30
010723	30	20	20	20	+S	OBS	OBS	–	50	40	30	10
010724	40	30	20	30	+S	OBS	0	0	30	40	80	30
010725	30	30	30	30	30	30	30	[40]	40	40	40	40
010726	40	40	40	40	40	30	[40]	[30]	20	20	30	30
010727	30	20	20	10	20	[30]	50	40	40	[40]	40	40
010728	30	20	30	20	20	3	[40]	40	40	50	50	50
010729	20	10	10	10	10	30	30	–	40	50	60	50
010730	10	OBS	–S	30	30	20	20	–	40	40	50	50
010731	30	20	20	10	10	20	30	[40]	40	40	50	60

12	13	14	15	16	17	18	19	20	21	22	23	Means
20	30	20	30	30	30	30	30	30	20	30	30	21
40	40	40	50	40	40	40	40	40	50	40	40	—
30	30	40	50	30	40	40	40	40	30	10	−10	33
30	−S	OBS	OBS	20	20	30	30	30	20	30	40	—
60	60	70	70	60	60	60	40	30	30	20	30	48
40	40	40	40	30	40	40	40	30	20	20	10	31
20	10	0	10	0	10	20	20	20	10	20	20	12
40	40	50	0	60	40	50	30	30	40	40	30	—
40	40	40	30	20	20	30	20	20	30	30	30	—
60	OBS	OBS	30	30	30	40	40	40	30	20	30	—
40	40	50	[50]	30	20	10	20	−10	OBS	OBS	+S	—
30	20	20	30	40	40	40	40	40	40	40	40	31
40	40	40	40	40	50	40	40	40	30	30	30	38
50	50	50	50	40	40	40	40	40	30	40	40	36
50	50	50	50	40	40	50	40	40	30	40	30	41
40	40	40	−S	OBS	50	OBS	OBS	OBS	−S	−S	0	—
20	20	30	40	30	30	30	30	30	30	20	20	—
50	50	50	50	50	−S	OBS	OBS	OBS	40	30	20	—
40	OBS	OBS	50	40	40	−S	OBS	OBS	OBS	30	0	—
OBS	OBS	OBS	50	40	30	10	20	20	30	40	30	—
20	10	20	20	60	20	OBS	30	OBS	10	40	50	—
20	10	20	40	50	40	50	40	50	60	40	30	35
30	30	10	20	10	30	50	50	40	40	50	40	—
30	40	30	40	40	40	40	40	50	40	40	30	—
50	30	40	40	40	50	50	40	40	40	40	40	38
40	40	40	40	20	OBS	OBS	30	40	30	30	40	—
40	40	40	40	50	50	50	40	50	40	30	30	37
50	50	50	50	50	50	40	30	30	40	30	20	38
50	60	50	60	50	50	50	50	30	20	20	10	36
50	60	50	50	50	50	40	40	30	30	30	30	—
70	70	70	70	50	40	40	30	20	20	30	30	38

Date	00	01	02	03	04	05	06	07	08	09	10	11
010801	20	10	10	10	20	30	[30]	30	40	50	50	50
010802	40	30	30	30	30	30	[40]	40	40	30	30	30
010803	20	10	10	10	10	10	0	20	30	40	50	70
010804	40	30	30	30	30	30	[40]	40	40	40	50	50
010805	30	30	30	30	-40	10	20	[30]	40	40	40	40
010806	30	30	20	30	30	30	-	-	40	50	50	40
010807	10	10	10	20	20	30	[40]	[30]	40	40	40	50
010808	20	10	20	20	20	30	[40]	[30]	30	30	30	40
010809	30	30	20	20	20	10	[50]	70	60	50	50	60
010810	30	30	30	30	30	[30]	30	30	30	40	40	40
010811	OBS	30	40	50	40	[50]	50	50	50	40	50	40
010812	40	30	20	30	30	20	40	50	50	50	50	50
010813	30	20	20	20	20	20	-	-	40	30	40	40
010814	20	20	10	10	20	20	[30]	40	40	40	50	50
010815	10	10	10	30	30	30	[40]	40	40	40	40	40
010816	20	20	30	20	30	30	[30]	30	20	30	40	30
010817	20	10	10	10	20	20	20	[30]	30	30	40	50
010818	10	20	20	30	20	[10]	20	20	30	30	40	50
010819	10	20	20	20	20	20	20	20	[30]	30	40	40
010820	20	10	10	10	10	20	20	-	-	40	40	40
010821	+S	OBS	OBS	10	10	20	80	-	80	80	50	40
010822	30	20	20	20	10	10	[10]	20	30	40	40	40
010823	30	30	30	30	30	30	[30]	30	30	40	40	40
010824	+S	OBS	20	10	10	20	80	[130]	80	80	70	50
010825	10	10	10	10	20	30	[30]	40	40	50	50	60
010826	30	30	30	20	20	30	30	30	[30]	40	50	60
010827	20	30	30	30	30	20	-	-	30	30	30	40
010828	20	30	20	30	30	30	[30]	[40]	4	40	50	50
010829	20	20	10	20	20	30	40	[30]	40	30	30	40
010830	20	10	10	10	10	20	[40]	40	50	40	40	40
010831	30	20	20	20	20	30	[10]	10	0	-10	-20	0

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	50	50	50	50	60	50	40	50	50	40	40	39
30	40	40	50	40	40	40	40	30	30	20	20	34
70	70	50	50	40	40	40	40	40	40	50	50	36
60	40	40	30	10	30	40	40	40	30	30	30	36
40	50	40	50	40	40	40	30	30	30	30	40	32
50	50	40	50	50	40	30	20	30	20	20	20	—
50	50	50	+S	30	50	40	40	40	30	30	20	33
40	40	40	30	30	-20	30	20	OBS	OBS	30	30	—
60	60	70	60	50	50	40	40	40	40	30	30	43
30	100	+S	+S	OBS	+S	OBS	OBS	OBS	OBS	OBS	+S	—
40	40	40	50	50	50	40	40	50	50	40	40	44
—	8	40	40	50	50	50	50	50	40	30	30	42
50	50	50	50	50	40	40	40	30	30	20	20	—
50	50	70	50	50	40	30	30	30	20	10	20	33
40	40	40	40	40	40	30	30	30	20	20	20	31
30	40	40	40	30	30	30	30	30	20	20	20	29
40	40	50	40	40	40	30	30	20	20	20	20	28
50	50	50	50	50	40	30	30	30	20	20	20	31
40	50	50	60	30	20	20	20	30	10	10	10	27
40	40	30	40	-S	OBS	50	20	30	OBS	OBS	30	—
40	40	40	40	40	40	40	40	40	30	30	30	—
40	50	50	40	40	40	30	40	30	40	40	40	32
50	50	50	60	60	—	OBS	OBS	-S	30	30	30	—
50	50	50	40	40	30	30	30	20	10	10	10	—
70	80	70	70	60	40	40	40	40	30	30	30	40
70	80	80	70	70	50	50	50	40	40	40	30	45
40	50	50	50	40	40	40	40	OBS	10	30	30	—
50	50	50	40	40	30	40	40	30	20	20	20	35
40	40	40	40	40	40	30	30	30	40	30	20	31
30	40	40	30	40	40	40	40	30	30	40	30	32
0	+S	30	20	30	20	20	20	30	30	10	-S	—

Date	00	01	02	03	04	05	06	07	08	09	10	11
010901	OBS	0	10	20	30	+S	[10]	50	50	40	50	50
010902	20	10	10	10	10	20	30	[20]	40	30	40	30
010903	30	30	20	20	20	-	-	-	40	40	30	30
010904	20	20	20	20	30	30	[30]	40	40	40	50	50
010905	-30	30	10	-10	-30	-60	[-30]	20	30	20	-30	-30
010906	-	-	-	-	-	-	-	-	-	-	-	-
010907	40	40	30	30	20	30	[30]	30	70	70	50	50
010908	40	40	40	30	40	50	[-20]	[10]	20	10	50	30
010909	OBS	OBS	OBS	OBS	OBS	OBS	OBS	OBS	70	80	50	30
010910	30	20	30	40	40	-	-	-	40	40	40	40
010911	40	40	40	20	30	40	[50]	40	40	40	40	30
010912	10	20	10	10	10	10	[20]	OBS	OBS	30	40	40
010913	20	20	20	10	20	30	[30]	40	40	70	50	50
010914	20	20	20	10	10	20	[20]	[20]	30	40	30	30
010915	-	-	40	30	20	30	40	[70]	40	80	80	40
010916	20	30	20	20	10	10	20	40	[20]	30	50	40
010917	30	40	30	20	10	-	20	30	30	40	40	40
010918	30	0	OBS	OBS	OBS	OBS	-	-	-	-	40	30
010919	40	30	40	30	40	40	[40]	40	30	40	40	40
010920	40	40	40	40	30	30	[30]	40	40	40	40	40
010921	30	30	30	20	30	30	[30]	40	40	50	50	50
010922	20	10	10	10	10	10	[20]	30	40	30	30	40
010923	20	20	20	20	20	20	20	30	40	20	30	-20
010924	10	-S	OBS	-10	10	-	20	60	70	(70)	(50)	50
010925	10	20	20	30	30	30	[40]	[40]	40	40	40	40
010926	0	20	30	40	40	50	[60]	60	40	20	10	10
010927	40	40	30	40	30	30	40	[40]	40	40	40	40
010928	40	40	30	30	30	40	[40]	50	50	50	60	60
010929	40	30	30	20	10	10	[10]	40	40	50	50	50
010930	50	50	40	50	50	70	70	40	[40]	40	40	50

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	40	30	30	30	20	30	30	30	20	20	—
OBS	30	40	40	40	30	40	OBS	30	30	30	30	—
30	40	40	30	30	20	30	30	20	20	20	20	—
50	40	—S	OBS	OBS	40	30	40	30	40	40	30	—
—30	—30	—30	—30	—10	—10	—20	—30	—20	—	—	—	—
30	40	50	30	0	10	10	40	50	50	50	40	—
30	40	30	40	40	60	70	60	80	60	50	50	46
—10	40	40	40	30	30	40	0	20	20	—10	0	24
30	OBS	30	30	OBS	—S	30	30	40	30	30	30	—
40	40	40	30	40	30	—10	—S	—30	30	30	30	—
30	20	30	40	40	30	30	30	30	30	20	20	33
110	—10	OBS	OBS	—20	10	40	30	30	30	40	30	—
40	40	40	40	30	20	40	40	40	40	40	30	35
20	20	20	0	OBS	OBS	30	—	—	—	—	—	—
40	40	30	10	10	0	—10	10	30	40	40	40	—
40	40	40	30	40	30	40	30	40	40	40	40	32
—S	OBS	60	+S	—10	—40	—30	10	20	10	30	10	—
OBS	OBS	40	40	50	50	50	60	40	40	40	40	—
40	40	40	30	30	30	30	40	40	40	40	40	37
40	40	40	40	30	30	30	20	20	30	20	20	34
50	50	40	40	40	40	30	30	20	30	30	20	35
40	40	50	40	40	40	40	40	30	30	40	30	30
0	—30	[60]	0	—10	—10	10	10	—20	0	—10	10	7
50	50	50	60	40	110	+S	20	30	30	20	10	—
40	40	40	40	40	30	50	50	50	50	40	30	37
10	10	20	30	40	40	40	40	40	40	40	40	32
40	40	40	30	30	40	40	40	40	40	30	40	38
60	60	50	50	50	50	60	50	50	60	50	40	48
50	50	40	50	40	50	50	50	50	50	50	50	40
40	40	50	50	50	50	40	30	30	40	40	50	46

Date	00	01	02	03	04	05	06	07	08	09	10	11
011001	50	40	40	40	60	—	[50]	(20)	30	20	30	40
011002	30	40	40	30	30	40	[40]	50	40	40	50	60
011003	40	40	50	40	40	60	[40]	40	20	30	40	50
011004	20	10	10	10	20	30	[40]	[30]	30	40	30	20
011005	30	30	20	30	20	30	[40]	80	70	60	50	40
011006	40	40	30	80	100	80	80	40	40	40	40	50
011007	30	40	20	20	10	10	[0]	[−10]	0	−10	20	40
011008	40	30	20	20	30	—	(10)	(40)	50	40	40	40
011009	20	30	40	40	30	20	10	[40]	40	40	40	40
011010	40	0	40	30	30	20	30	[40]	30	30	30	40
011011	20	20	20	20	20	30	40	[70]	40	40	40	40
011012	30	20	20	20	20	30	[30]	[40]	30	40	50	50
011013	20	30	30	30	20	20	[30]	—	40	40	50	50
011014	30	30	30	50	80	90	130	[140]	90	80	20	30
011015	10	10	10	10	10	—	30	[40]	30	20	—	40
011016	20	40	30	30	40	40	[40]	[40]	40	50	50	40
011017	40	40	40	30	30	30	[20]	30	20	20	20	20
011018	10	20	20	10	10	−10	[−20]	[−10]	−30	−10	20	20
011019	30	50	80	60	60	40	30	30	40	40	40	70
011020	30	20	10	30	20	20	20	10	0	0	−10	−10
011021	−10	−10	−30	−20	10	30	[20]	30	10	10	30	30
011022	10	10	10	20	10	30	40	—	30	30	20	10
011023	20	30	30	20	20	20	20	—	40	40	40	50
011024	20	20	30	20	10	10	[20]	[30]	30	30	40	40
011025	−80	−30	20	40	50	60	60	60	30	20	30	20
011026	20	20	10	20	20	30	[30]	20	0	20	30	30
011027	10	0	−40	−10	20	30	[20]	30	20	20	30	30
011028	40	40	40	40	30	40	40	[20]	10	10	30	30
011029	110	130	60	80	60	40	—	—	10	20	20	−10
011030	70	40	30	30	40	40	40	[40]	30	−10	−10	−20
011031	0	0	0	10	10	20	20	30	40	[40]	30	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
40	40	40	40	30	30	30	30	30	30	30	30	–
60	40	40	40	30	20	10	30	20	20	20	30	35
50	50	40	40	40	40	40	30	30	20	20	20	38
30	30	20	10	–10	0	10	20	0	10	30	30	20
40	30	30	30	30	30	40	40	30	30	30	30	37
50	50	[40]	40	30	40	40	40	40	30	30	20	46
40	40	40	30	30	20	20	30	40	40	20	40	23
40	40	30	30	30	40	30	30	40	30	20	30	–
40	40	40	40	40	30	40	40	40	40	30	30	35
30	40	30	30	30	30	40	40	30	30	20	10	31
40	40	40	40	50	60	60	50	40	40	30	30	38
50	50	40	40	30	40	40	30	40	30	20	20	34
50	60	60	50	50	60	80	40	40	30	30	30	41
40	40	40	40	40	40	30	40	40	30	30	20	49
40	40	30	40	30	40	30	30	30	20	20	20	–
60	60	80	70	40	40	40	50	40	50	40	40	45
10	10	10	10	30	40	30	30	40	40	30	30	27
10	30	20	40	30	30	40	40	50	50	40	40	19
80	70	50	50	40	40	60	50	40	40	40	40	49
–10	10	10	0	10	20	30	20	10	10	10	0	11
40	30	–10	OBS	+S	10	30	OBS	–S	–S	OBS	20	–
20	30	30	30	30	40	40	30	40	30	30	20	26
50	60	40	40	40	50	50	40	40	30	30	20	36
40	40	40	40	40	40	40	30	30	30	–50	–100	22
10	20	10	20	20	–10	20	30	30	30	30	20	21
40	40	30	40	40	30	10	10	30	20	40	20	25
40	40	40	20	40	20	40	40	30	30	30	40	24
30	40	30	30	30	20	30	–S	OBS	30	OBS	OBS	–
–30	–30	–20	0	–10	–10	–10	–10	70	60	60	70	–
–20	–10	–10	–10	10	10	10	10	10	0	0	0	13
40	40	40	50	40	50	70	50	60	50	40	0	32

Date	00	01	02	03	04	05	06	07	08	09	10	11
011101	0	10	20	10	10	10	20	[30]	40	40	40	40
011102	40	30	30	20	30	40	40	[40]	40	40	40	40
011103	40	40	40	40	40	40	40	[40]	40	40	40	40
011104	30	40	30	30	30	40	70	[80]	30	0	-10	0
011105	40	40	40	40	40	40	-	-	-	40	40	40
011106	40	40	20	0	10	10	20	[30]	20	10	0	-20
011107	30	40	40	30	20	10	20	[30]	[30]	20	30	50
011108	20	10	10	10	10	10	10	[10]	[40]	40	0	0
011109	OBS	OBS	OBS	OBS	OBS	OBS	20	30	[30]	40	40	40
011110	40	60	60	40	40	50	50	[50]	50	50	40	40
011111	30	20	10	20	20	20	10	[-20]	-40	-40	-50	-30
011112	10	20	10	20	30	30	-	-	-	-	0	20
011113	40	40	30	30	20	30	40	[60]	40	40	30	10
011114	40	40	40	40	50	60	60	[50]	60	60	50	50
011115	40	40	40	40	40	40	50	[60]	[60]	60	70	80
011116	60	50	50	40	40	40	40	70	[30]	20	30	30
011117	30	30	30	30	30	30	30	40	[40]	[60]	60	60
011118	0	10	20	20	20	30	60	[80]	40	20	30	20
011119	10	10	20	10	10	20	-	-	-	-	40	40
011120	20	20	10	OBS	10	20	20	[30]	[40]	40	40	40
011121	30	30	30	30	30	30	30	[30]	30	30	40	40
011122	30	20	20	20	20	10	20	[30]	40	40	40	30
011123	10	OBS	10	OBS	OBS	20	20	OBS	40	60	50	30
011124	30	30	30	20	20	30	30	[40]	30	30	30	40
011125	40	40	40	3	40	40	40	40	[40]	50	50	50
011126	40	50	50	40	40	40	50	-	-	30	20	30
011127	-10	50	40	40	50	30	30	[40]	20	0	10	-10
011128	20	30	20	30	50	40	100	[120]	[80]	40	50	20
011129	40	40	30	30	20	30	50	[60]	50	40	40	40
011130	-160	-S	-S	-S	-S	-80	-60	OBS	-20	30	10	40

12	13	14	15	16	17	18	19	20	21	22	23	Means
50	40	40	40	50	50	40	60	40	40	40	40	33
40	40	50	50	60	50	40	40	50	40	40	40	40
40	60	60	70	70	60	30	20	30	30	30	30	42
20	40	40	40	40	30	20	-10	20	20	20	10	28
40	40	40	40	50	50	40	40	40	40	40	40	-
-30	-10	30	40	50	80	40	70	70	50	10	10	25
40	40	40	50	60	60	20	20	40	40	40	30	35
30	50	60	50	40	40	50	60	60	40	20	50	30
40	40	40	50	70	60	60	70	80	70	70	50	-
40	50	40	40	40	40	50	40	30	30	30	30	43
-20	-30	-30	10	20	30	20	30	30	30	30	20	4
30	40	30	30	40	70	50	-10	30	30	40	40	-
20	0	0	-S	-S	-S	50	80	80	70	60	40	-
50	50	60	60	70	60	60	60	50	40	40	40	52
80	80	70	60	80	80	80	40	50	50	50	50	58
50	50	50	60	60	70	70	70	60	50	40	40	49
50	40	20	30	40	30	20	20	10	10	-10	0	30
20	20	10	20	20	10	20	30	20	20	10	20	24
40	40	40	40	40	40	40	30	30	30	30	30	-
40	40	50	40	40	40	40	40	40	30	40	40	33
30	40	40	40	40	30	30	30	30	30	20	20	32
30	40	40	40	40	40	20	0	0	-10	30	30	26
40	40	50	40	50	40	50	50	40	40	40	30	-
30	OBS	OBS	50	50	50	50	50	40	40	40	40	-
50	50	40	40	50	50	50	60	50	50	40	40	45
20	20	-10	10	30	70	40	30	40	40	10	-20	-
-10	-10	0	10	10	0	10	30	30	-10	0	30	16
60	40	50	30	40	60	40	40	60	60	40	40	48
30	30	50	20	30	40	-120	-160	-40	120	70	-40	21
40	70	80	90	90	80	80	70	60	50	40	30	-

Date	00	01	02	03	04	05	06	07	08	09	10	11
011201	30	30	30	30	20	40	40	40	[60]	60	50	60
011202	70	40	40	40	70	100	130	[130]	110	80	90	80
011203	50	40	40	40	60	40	—	40	30	30	[60]	—
011204	20	10	20	20	30	30	0	[30]	0	—20	—30	—40
011205	—40	—10	—30	—40	—30	—20	—10	[20]	40	0	0	50
011206	0	—30	—30	OBS	—S	OBS	OBS	OBS	OBS	—S	OBS	—10
011207	30	20	30	20	10	20	20	[10]	30	40	30	30
011208	60	70	50	40	50	50	70	[70]	80	70	70	60
011209	70	50	40	40	40	40	40	60	[60]	60	60	60
011210	60	60	70	60	70	70	—	60	—	60	70	70
011211	40	50	30	20	10	10	30	[20]	+S	80	40	40
011212	60	50	70	90	30	30	30	+S	OBS	OBS	90	90
011213	40	20	40	60	60	50	60	50	60	60	60	60
011214	0	10	10	20	10	10	20	[20]	30	30	30	40
011215	40	40	50	50	50	60	60	70	80	80	80	80
011216	30	10	20	20	20	10	0	—10	0	20	30	40
011217	50	50	50	60	60	60	—	—	50	50	50	40
011218	30	10	0	10	10	—20	—10	[—10]	[20]	30	30	40
011219	30	30	40	40	40	40	30	[40]	[30]	40	40	40
011220	40	40	30	30	30	30	40	[40]	[50]	40	50	40
011221	40	30	30	30	20	10	20	[40]	40	40	50	50
011222	40	40	0	30	20	40	40	[30]	40	50	50	50
011223	—30	OBS	OBS	30	40	40	40	[40]	50	60	60	40
011224	50	50	40	40	30	40	30	[50]	70	70	80	120
011225	70	50	40	0	—10	—10	—	30	30	40	40	50
011226	40	40	40	50	50	40	50	[50]	70	60	50	30
011227	50	60	40	40	30	30	40	[50]	—	50	50	50
011228	40	40	30	30	0	0	[—10]	10	20	30	20	30
011229	50	40	40	40	50	10	60	[70]	50	40	50	60
011230	30	40	40	50	50	40	40	40	40	[40]	40	50
011231	30	30	30	30	40	40	40	[50]	—	50	OBS	30

12	13	14	15	16	17	18	19	20	21	22	23	Means
80	80	90	80	120	100	90	100	90	90	80	80	65
80	70	60	50	80	60	80	70	80	30	30	40	71
60	80	70	40	70	60	40	40	20	30	30	30	-
-20	0	-20	-30	-10	-10	-20	-50	-50	-30	-50	-40	-11
70	40	40	80	150	130	60	20	0	10	10	0	23
-100	-50	30	30	50	70	120	100	120	+S	80	40	-
20	20	20	40	50	60	60	70	80	80	70	60	38
60	70	60	80	80	90	80	100	90	80	90	80	71
70	80	80	80	70	70	90	90	90	90	80	70	66
70	80	80	80	80	70	80	90	80	70	60	40	-
60	40	60	40	40	40	70	50	80	70	50	60	45
70	40	80	100	80	OBS	40	80	80	80	50	60	-
60	60	40	30	20	20	-20	-80	-50	-30	-10	-10	27
40	60	60	60	40	30	30	30	40	40	30	20	30
80	70	40	20	30	70	60	50	50	40	30	20	54
30	40	50	70	60	60	60	70	70	60	60	60	37
50	50	50	30	40	40	30	50	70	50	40	20	-
40	30	40	40	40	40	50	50	40	40	30	40	25
40	30	40	30	40	50	40	50	40	50	40	40	39
40	40	OBS	40	30	50	50	50	70	70	60	40	43
50	30	30	40	40	30	30	20	20	20	40	40	33
50	50	50	50	50	70	70	50	40	0	20	20	40
50	40	50	40	50	60	50	50	70	70	50	40	-
110	70	110	80	70	70	70	70	70	60	80	90	68
50	50	40	50	40	40	50	60	60	50	40	40	39
60	70	60	90	80	110	90	100	90	60	80	60	63
50	50	50	50	50	60	70	50	50	50	40	30	47
40	30	60	60	50	40	60	30	30	40	40	50	32
70	60	60	60	60	60	70	70	40	30	20	30	50
50	50	50	50	60	50	40	50	40	40	30	30	43
50	50	50	0	0	40	50	40	40	40	-30	-40	-

Hourly means of the quantities of positive and negative
1999

Month		00	01	02	03	04	05	06	07	08	09	10	11
9901	+	0	0	0	0	0	0	0	0	0	0	0	0
9901	-	0	0	0	0	0	0	0	0	0	0	0	0
9902	+	0	0	0	0	0	0	0	0	0	0	0	0
9902	-	0	0	0	0	0	0	0	0	0	0	0	0
9903	+	0	0	0	0	0	0	0	0	0	0	0	0
9903	-	0	0	0	0	0	0	0	0	0	0	0	0
9904	+	1	0	0	0	0	0	0	0	0	0	0	0
9904	-	0	0	0	0	0	0	0	0	0	0	0	0
9905	+	6	4	0	2	0	0	0	0	0	0	0	0
9905	-	3	5	0	0	0	0	0	0	0	0	0	0
9906	+	14	3	0	0	0	0	0	7	0	0	0	3
9906	-	9	0	0	0	0	0	0	0	0	0	0	0
9907	+	2	18	0	12	1	19	20	5	18	11	4	6
9907	-	26	22	0	11	4	18	7	4	23	2	2	10
9908	+	0	0	0	0	0	0	1	3	4	0	0	0
9908	-	0	0	0	0	0	0	0	3	4	0	0	0
9909	+	0	0	0	0	0	0	1	0	1	1	7	0
9909	-	0	0	0	0	0	0	0	0	1	0	9	2
9910	+	0	1	0	0	0	1	0	0	0	0	0	0
9910	-	0	0	0	0	0	0	0	0	0	0	0	0
9911	+	0	0	0	0	0	0	0	0	0	0	0	0
9911	-	0	0	0	0	0	0	0	0	0	0	0	0
9912	+	0	0	0	0	1	0	0	0	0	0	0	2
9912	-	0	0	0	0	1	0	0	0	0	0	0	0

charges transported by point-discharge for each month

12	13	14	15	16	17	18	19	20	21	22	23	Means
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0,1
0	10	0	0	0	0	0	0	0	0	0	0	0,4
0	0	0	0	0	0	0	1	0	1	5	6	1,0
6	0	0	0	8	0	0	1	1	0	2	6	1,3
1	26	6	11	14	13	18	13	6	12	1	22	7,1
2	1	39	26	36	10	43	16	9	6	28	6	9,6
8	1	0	24	4	11	9	4	0	0	8	9	8,1
8	1	1	12	7	9	19	18	2	1	10	13	9,6
0	7	8	5	0	16	8	0	7	15	4	4	3,4
0	3	7	0	3	30	10	0	5	15	5	5	3,8
0	0	1	7	8	5	9	0	1	4	0	1	1,9
0	0	1	9	6	8	0	0	6	1	0	0	1,8
0	0	0	0	0	0	0	0	0	1	0	0	0,1
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	4	1	1	0	0	0	1	0	0	0	0,4
0	3	5	3	0	0	0	0	2	0	0	0	0,6

Hourly means of the quantities of positive and negative
2000

[illegible]

charges transported by point-discharge for each month

[illegible]

IONOSPHERE DATA

Mean ionospheric absorption $L'(dB)$ at oblique incidence (A3)

$$f = 270 \text{ kHz}$$

The following tables give the values of mean ionospheric absorption at oblique incidence (A3) for certain zenith distances of the Sun (χ) expressed in decibels (dB). Values for ground sunset (SS) and ground sunrise (SR) are given for periods of 20 minutes centered on the times of $\chi = 90^\circ$. Night values have been determined by taking the periods ranging from $\chi = 100^\circ$ to 23 00 GMT. The date column gives year, month, day (e.g. 990101 indicates 1999 January 1). SS and Night values in actual row are valid for the actual day, however, the SR values always for the next day's dawn. Values uncertain for some reason are entered in round brackets (). Some gaps are due to missing records.

The sky wave of the transmitter Československo ($f = 272 \text{ kHz}$) has been recorded since January 1967. The geographical coordinates of the reflection point are 48.4° N , 17.1° E . Because of reconstruction works on the transmitter Československo, the absorption measurement at 272 kHz and the publication of data were suspended from April 1975 till September 1978. (At present the transmitter frequency is 270 kHz.) Due to changes and repeated troubles in transmitting conditions the publication of absorption data has been abandoned from August 10, 1999.

The equipment and the method have been described in the papers by BENCZE P and MÄRCZ F: "Atmosphärisch-elektrische und ionosphärische Messungen im Observatorium bei Nagycenk". Observatoriumsberichte des Geophysikalischen Forschungslaboratoriums der Ungarischen Akademie der Wissenschaften vom Jahre 1966, Sopron, 1967, as well as by BENCZE P, HORVÁTH J, MÄRCZ F: "A new equipment for the measurement of ionospheric absorption" Geophysical Observatory Report of the Geodetic and Geophysical Research Institute of the Hungarian Academy of Sciences, Year 1975. Observatory of Nagycenk, Sopron, 1976. Further information is given by BENCZE P and MÄRCZ F: "The Geophysical Observatory near Nagycenk II. Atmospheric electric and ionospheric measurements" (*Acta Geod. Geoph. Mont. Hung.*, 16, 1981, 353-357).

See CD (program Seenck.exe, menu item Ionosphere/Absorption).

Mean ionospheric absorption L' (dB) at oblique incidence (A3)
 $f = 270$ kHz
 1999

Date	SS	Night	SR
990101	22.2	15.7	29.2
990102	35.2	14.1	19.9
990103	33.2	21.0	23.8
990104	35.2	21.8	28.2
990105	35.2	22.2	27.2
990106	35.2	22.2	37.7
990107	41.2	26.4	37.7
990108	28.2	20.2	27.2
990109	37.7	(20.6)	
990110	22.7	21.0	25.0
990111	41.7	23.8	33.2
990112	28.2	25.7	19.5
990113	35.2	23.8	23.8
990114	27.2	26.4	30.3
990115	31.7	23.2	25.0
990116	31.7	23.2	28.2
990117	29.2	23.8	27.2
990118	35.2	21.8	30.3
990119	23.8	25.7	33.2
990120	27.2	27.2	28.2
990121	27.2	(18.9)	
990122			
990123	33.2	18.9	31.7
990124	20.6	25.7	31.7
990125	27.2	27.2	28.2
990126	30.3	27.2	31.7
990127	31.7	25.7	
990128	41.2	27.2	37.7
990129	37.7	26.4	31.7
990130	41.2	29.2	29.2
990131	35.2	26.4	31.7
990201	33.2	24.4	18.6
990202	25.0	19.9	25.0
990203	41.2	26.4	23.8
990204	25.7	24.4	27.2
990205	37.7	23.8	26.4
990206	31.7	20.2	25.7
990207	26.4	19.5	24.4
990208	25.7	27.2	31.7

Date	SS	Night	SR
990209	26.4	21.4	24.4
990210	33.2	19.9	25.7
990211	35.2	21.8	27.2
990212	30.3	21.8	25.7
990213	29.2	18.3	21.0
990214	23.8	27.2	28.2
990215	35.2	21.0	31.7
990216	33.2	28.2	27.2
990217	30.3	26.4	33.2
990218	35.2	26.4	29.2
990219	33.2	30.3	33.2
990220	31.7	25.0	33.2
990221	35.2	23.8	27.2
990222	35.2	22.2	28.2
990223	27.2	22.7	28.2
990224	35.2	18.6	
990225	27.2	22.2	37.7
990226	26.4	23.8	41.2
990227	37.7	19.2	29.2
990228	35.2	24.4	47.2
990301	23.8		
990302	21.4	21.8	21.8
990303	33.2	20.6	28.2
990304	23.2	23.2	23.8
990305	23.2	18.1	23.8
990306	27.2	17.8	23.8
990307	21.8	23.2	26.4
990308	26.4	21.0	28.2
990309	26.4	19.5	23.8
990310	25.0	(21.8)	25.0
990311	30.3	21.4	28.2
990312	23.2	18.9	23.8
990313	19.2	21.8	18.3
990314	19.2	18.3	21.8
990315	16.9	19.5	22.7
990316	21.8	21.0	21.0
990317	22.2	18.3	28.2
990318	26.4	21.0	21.4
990319	25.0	17.6	27.2
990320	23.8	18.3	28.2
990321	25.7	18.3	25.0
990322	22.7	17.8	27.2
990323	24.4	18.1	25.0

Date	SS	Night	SR
990324	30.3	21.4	27.2
990325	24.4	18.1	31.7
990326	28.2	19.9	27.2
990327	23.2	18.1	27.2
990328	24.4	21.0	19.2
990329	22.2	20.6	22.2
990330	27.2	19.2	23.2
990331	19.5	17.8	21.4
990401	22.7	18.3	23.8
990402	25.0	21.0	22.2
990403	27.2	19.2	25.7
990404	22.7	25.0	22.2
990405	24.4	19.9	22.7
990406	22.7	19.9	22.7
990407	25.0	16.7	21.4
990408	23.8	19.2	29.2
990409	33.2	17.6	21.4
990410	21.8	23.2	18.6
990411	22.2	14.6	21.8
990412	26.4	19.5	23.2
990413	30.3	17.8	24.4
990414	26.4	19.9	25.0
990415	30.3	19.2	24.4
990416	26.4	21.8	21.8
990417	27.2	18.3	21.0
990418	24.4	19.5	19.9
990419	23.8	19.9	20.2
990420	23.8	23.8	24.4
990421	19.5	26.4	21.0
990422	26.4	23.8	23.2
990423	21.4	(26.4)	23.2
990424	25.0	21.4	
990425	17.1	19.5	29.2
990426	26.4	16.5	24.4
990427	28.2	21.8	23.2
990428	23.8	23.2	
990429	31.7	23.2	24.4
990430	23.8	17.3	26.4
990501	29.2	23.8	27.2
990502	35.2	21.0	21.8
990503	26.4	21.0	24.4
990504	24.4	17.8	33.2
990505	35.2	18.6	27.2

Date	SS	Night	SR
990506	33.2	19.5	28.2
990507	26.4	21.4	19.9
990508	31.7	23.8	23.8
990509	41.2	19.9	33.2
990510	28.2	19.9	22.2
990511	33.2	22.7	26.4
990512	29.2	20.2	23.2
990513	35.2	22.7	23.2
990514	25.7	22.2	27.2
990515	30.3	17.6	31.7
990516	31.7	26.4	29.2
990517	37.7	24.4	25.7
990518	25.7	24.4	25.7
990519	30.3	26.4	27.2
990520	29.2	17.8	28.2
990521	24.4	20.6	30.3
990522	28.2	21.8	25.0
990523	31.7	18.3	22.7
990524	26.4	19.2	25.0
990525	23.8	24.4	28.2
990526	33.2	21.8	27.2
990527	27.2	21.4	24.4
990528	25.7	21.0	27.2
990529	30.3	26.4	31.7
990530	31.7	23.8	31.7
990531	25.7	26.4	26.4
990601	24.4	21.0.	27.2
990602	31.7	20.6	24.4
990603	37.7	23.8	31.7
990604	33.2	22.7	28.2
990605	27.2	21.8	29.2
990606	30.3.	23.2	27.2
990607	31.7	20.2	28.2
990608	27.2	23.8	35.2
990609	30.3	21.4	28.2
990610	26.4	26.4	27.2
990611	30.3	23.8	(26.4)
990612	23.8	24.4	(33.2)
990613	31.7	28.2	37.7
990614	24.4	19.2	27.2
990615	26.4	24.4	26.4
990616	26.4	25.7	26.4
990617	35.2	25.0	26.4

Date	SS	Night	SR
990618	30.3	23.2	(30.3)
990619	30.3	23.8	(28.2)
990620	24.4	20.2	26.4
990621	24.4	23.8	31.7
990622	28.2	26.4	26.4
990623	25.0	19.5	
990624	31.7	26.4	24.4
990625	26.4	23.2	31.7
990626	24.4	21.0	27.2
990627	29.2	24.4	27.2
990628	35.2	21.0	27.2
990629	30.3	27.2	31.7
990630	27.2	24.4	26.4
990701	30.3	24.4	26.4
990702	30.3	28.2	29.2
990703	28.2	26.4	29.2
990704	21.4	27.2	37.7
990705	26.4	21.4	25.7
990706	28.2	23.8	24.4
990707	21.8	21.4	26.4
990708	26.4	33.2	31.7
990709	30.3	26.4	27.2
990710	28.2	24.4	29.2
990711	29.2	28.2	33.2
990712	31.7	21.0	27.2
990713	35.2	23.2	28.2
990714	31.7	23.8	26.4
990715	29.2	25.7	24.4
990716	29.2	24.4	29.2
990717	37.7	27.2	25.7
990718	25.7	29.2	35.2
990719	29.2	21.8	27.2
990720	27.2	23.8	24.4
990721	29.2	25.7	27.2
990722	27.2	26.4	31.7
990723	23.8	25.7	31.7
990724	25.7	25.0	25.7
990725	24.4	23.8	26.4
990726	30.3	21.4	26.4
990727	35.2	19.9	31.7
990728	26.4	23.2	25.7
990729	25.7	27.2	23.8
990730	30.3	22.7	33.2

Date	SS	Night	SR
990731	27.2		
990801	27.2	23.2	28.2
990802	27.2	20.2	23.2
990803	28.2	(21.4)	(27.2)
990804			
990805	(31.7)	(23.8)	(26.4)
990806			
990807	29.2	26.4	30.3
990808	29.2	24.4	23.8
990809	29.2	19.5	

Due to changes and repeated troubles in transmitting conditions the publication of absorption data has been abandoned from August 10, 1999

THE IPS-42 IONOSONDE STATION

K. KOVÁCS

The IPS-42 typ. ionosonde (Fig. 1), produced by the KEL Aerospace is to sound the ionosphere at regular intervals by the pulse-echo technique.

The operating frequency of a pulse transmitter is varied over the range 1 MHz to 22.6 MHz. The resulting echoes from the ionosphere are detected by a receiver tuned automatically to the same frequency as the transmitter. The echoes received are processed to remove noise and interference and are displayed on a cathode ray tube along with a graticule indicating virtual height along one axis and frequency along the other.

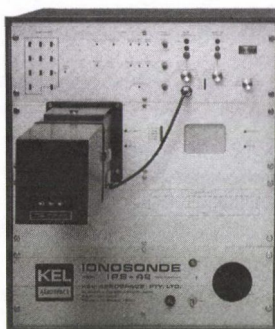


Fig. 1. The IPS-42 ionosonde

The instrument is connected to an IBM PC with a special interface and the data are stored in the hard disc. These records are called ionograms (Fig. 2).

Further technical specifications of the instrument are the following.

The transmitter final power amplifier produces a 5 kW peak pulse-power output. The digital Frequency Synthesizer provides coverage from 1 MHz to 22.6 MHz in 576 logarithmic steps. A complete frequency sweep to produce an ionogram takes 12 seconds of a 20 seconds program cycle. A group of front panel switches allows the operator to select manually any of the synthesizer's 576 channels.

The transmitter pulse width is 41.67 μ s and the pulse interval is 5.33 ms.

The configuration of the antenna system is illustrated in Fig. 3.

We employ two vertical delta antennas. Each antenna consists of a large trian-

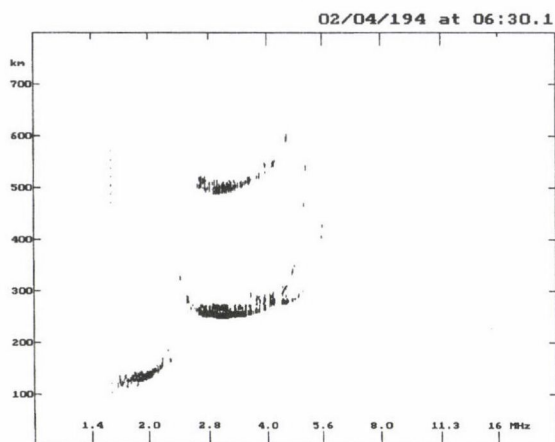


Fig. 2. Sample ionogram recorded in Nagycenk Observatory with IPS-42

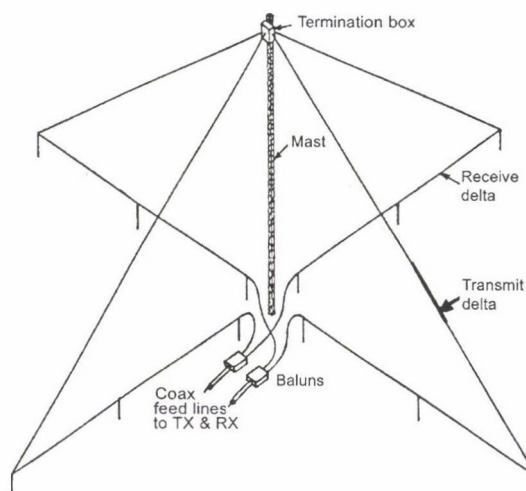


Fig. 3. Vertical delta antenna

gular loop of wire, supported at the apex. The height of the mast is 30 m and the horizontal part of the delta is 2 m from the ground. The antennas are mounted orthogonally to reduce coupling between them. The Vertical Delta antenna has an average feedpoint impedance of about 600 ohms and requires a balanced feedline.

The Maximum Virtual Height Range of the instrument is 800 km and the Height Marker Interval is 100 km.

The regular measurements began in 1998. The ionograms are archived in CD ROM and are available by special arrangement.

SCHUMANN RESONANCE OBSERVATIONS

G. SÁTORI

Schumann resonances are the electromagnetic eigenmodes of the Earth-ionosphere cavity maintained by the world thunderstorm activity (Schumann 1952).

The first efforts were already made in sixties to record the variations of the natural electromagnetic energy source in the Schumann resonance (SR) frequency range. P Bencze constructed an equipment for measuring SR and reported on the first results together with A Ádám (Ádám and Bencze 1963).

The experiments were renewed in eighties to realize the continuous measurements of Schumann resonance frequencies and amplitudes. Since May of 1993, the vertical electric field component in SR frequency range between 2 and 25 Hz has regularly been measured in the Nagycenk Observatory (47.6°N, 16.7°E) using a very stable ball-antenna, a preamplifier with high input impedance and low noise, an amplifier and a personal computer with high speed, multi-channel AD-converter. The complex demodulation as a spectral technique has been applied for the quasi-continuous determination of the actual peak-frequencies and the corresponding amplitudes of the first three SR modes (Sátori et al. 1996).

Using convolution filters the phase-variations of the complex wave vector relating to the central period of the filters are determined. By computing the phase changes versus time the frequency (and the amplitude) can also be monitored in time. Using this spectral technique, the frequency can be determined within a given range of frequencies, in the case applied here in the frequency range of the first three Schumann-resonance modes, namely between 7–9 Hz, 13–15 Hz and 19–21 Hz. An alternate sampling and computation process yields a quasi real-time technique.

The horizontal magnetic field components (north-south and east-west) have regularly been measured since January of 1997 using induction coils. The spectral technique is the same as in case of the vertical electric field component.

The electronics of the SR recording system was developed by J Pongrácz and J Horváth, the ball-antenna was constructed by Gy Pála.

Recording SR-transients started in the frame of US-Hungarian Joint Found (JF.554) in 1998. These events, so called Q-bursts, are excited by individual energetic lightning strokes.

The hourly averages of the peak-frequencies and the amplitudes for the first three modes and SR transients for selected time periods (international campaigns) are available (e-mail: satori@ggki.hu). Figure 1 shows Schumann resonance recording system with the ball-antenna for the measurement of the vertical electric field component, as well as the two induction coils for the horizontal north-south and east-west magnetic field components. Figure 2, as example, exhibits the daily frequency and amplitude variations of the first three modes characteristic for a winter month. Figure 3 depicts a SR-transient.

Some results based on SR observations

The observation of Schumann resonances is important from the point of view of the world thunderstorm activity in the troposphere, as well as the different emissions (red sprite, blue jet, elves) induced by lightning strokes and large scale influences of extraterrestrial origin in the lowest ionosphere.

The semiannual variations of SR amplitudes measured at the Nagycenk Observatory, Central Europe, are the manifestation of the semiannual variation of the surface air temperature in the tropical continental regions (Sátori and Zieger 1996). The latter is due to the semiannual wave of solar insolation with maxima at the equinoxes. The magnitude of the semiannual temperature variation is about 1.5–2.0 °C. The high significance level of the semiannual variation of the SR amplitudes at Nagycenk shows that the quality of this SR data set makes it suitable for detecting temperature variations at the level of some tenths of a degree centigrade. In this way, the observation of the SR amplitudes/intensities have great importance from the point of view of global climatic changes.

Parameters of global thunderstorm activity were deduced from the long term Schumann resonance records at Nagycenk (Nickolaenko et al. 1998).

The ENSO (El Niño Southern Oscillation) phenomenon is among others characterized by sea surface temperature anomaly in the equatorial Pacific which can affect weather patterns around the world. A meridional redistribution of the world thunderstorm activity was deduced from the variations of SR frequencies on the ENSO time scale observed at Nagycenk (Sátori and Zieger 1999).

See CD (program Seenck.exe, menu item SchumannRes).

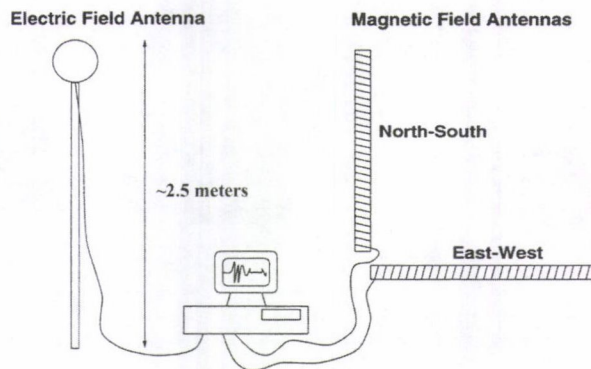


Fig. 1. Schumann resonance recording system: ball-antenna (top left), block diagram of the measurement (top middle), induction coils (top right), data acquisition system (bottom left), hut for the induction coils (bottom right)

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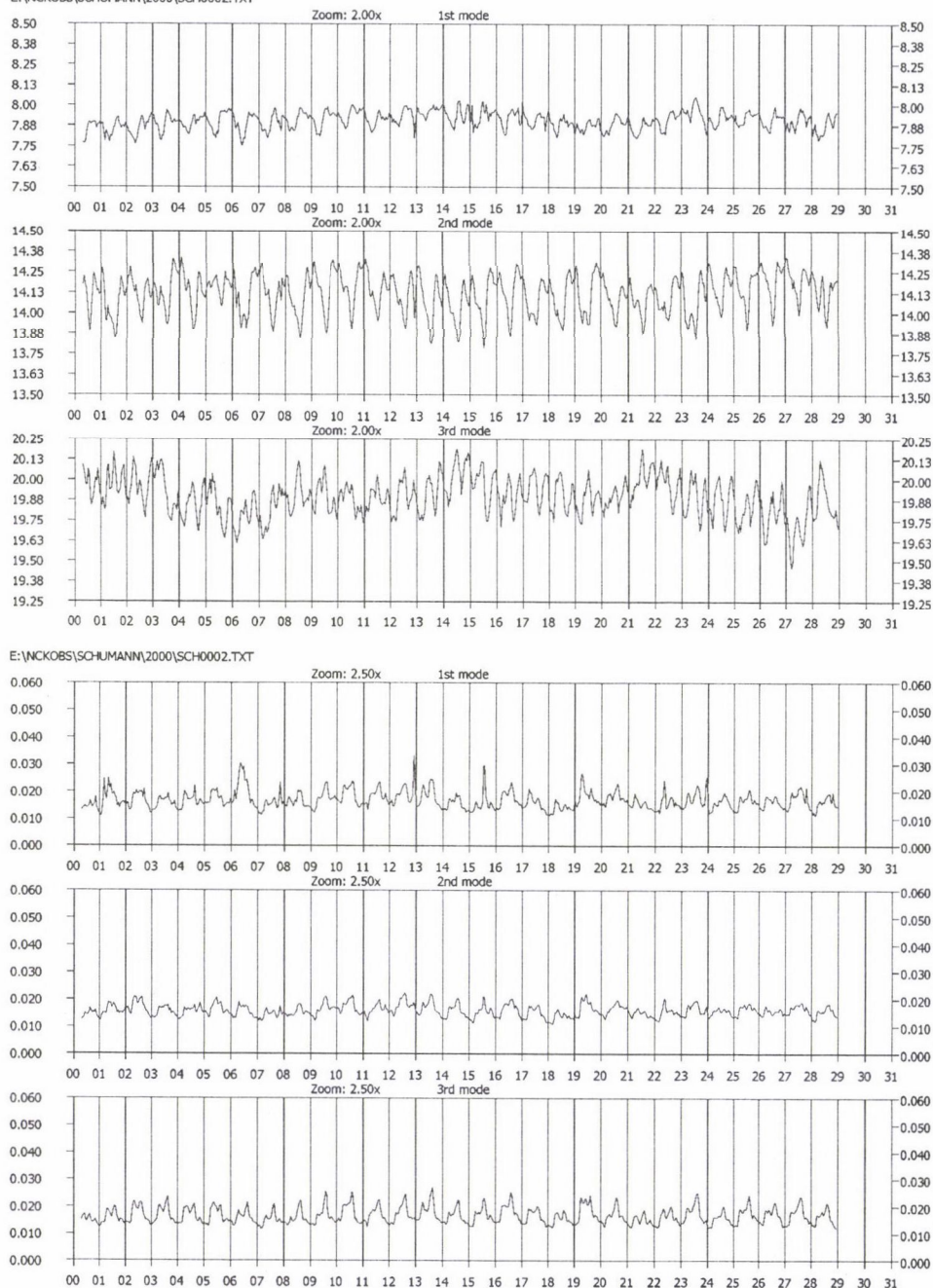


Fig. 2. Hourly means of SR frequencies in Hz (top) and relative amplitudes in V (bottom) measured for the first three modes in the days of February, 2000

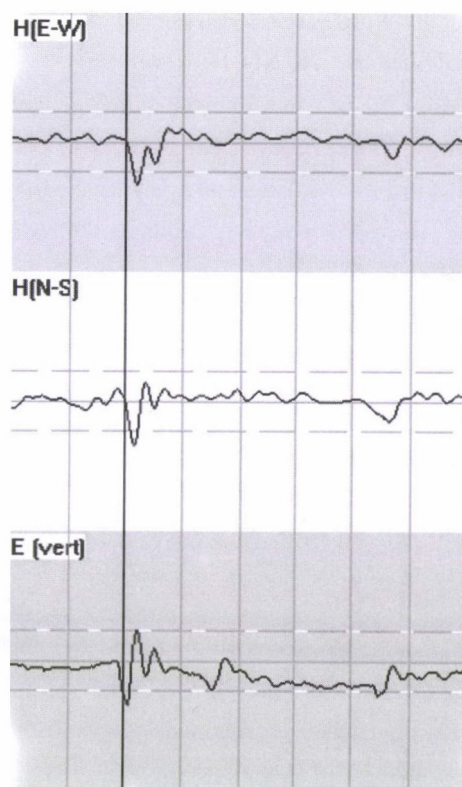


Fig. 3. SR-transient recorded at Nagycenk. Time markers include intervals of 100 ms. The horizontal broken lines indicate the trigger level of ± 0.6 V

References

- Ádám A, Bencze P 1963: Study of natural energy sources in the low frequency band (in Hungarian). *Magyar Geofizika*, 4, 29–35.
- Nickolaenko A P, Satori G, Zieger B, Rabinowicz L M, Kudintseva I G 1998: Parameters of global thunderstorm activity deduced from the long term Schumann resonance records. *J. Atmos. Sol. Terr. Phys.*, 60, No. 3, 387–399.
- Satori G, Zieger B 1996: Spectral characteristics of Schumann resonances observed in Central Europe. *J. Geophys. Res.*, 101, No. D23, 29663–29669.

- Sátori G, Zieger B 1999: El Niño related meridional oscillation of global lightning activity. *Geophys. Res. Lett.*, 26, NO 10, 1365–1368.
- Sátori G, Szendrői J, Verő J 1996: Monitoring Schumann Resonances – I. Methodology. *J. Atmos. Terr. Phys.*, 58, No. 13, 1475–1481.
- Schumann O W 1952: Über die strahlungslosen Eigenschwingungen einer leitenden Kugel, die von einer Duftsicht und einer Ionosphärenhülle umgeben ist. *Z. Naturforsch.*, 7a, 149–154.

IV. METEOROLOGICAL OBSERVATIONS

1999-2001

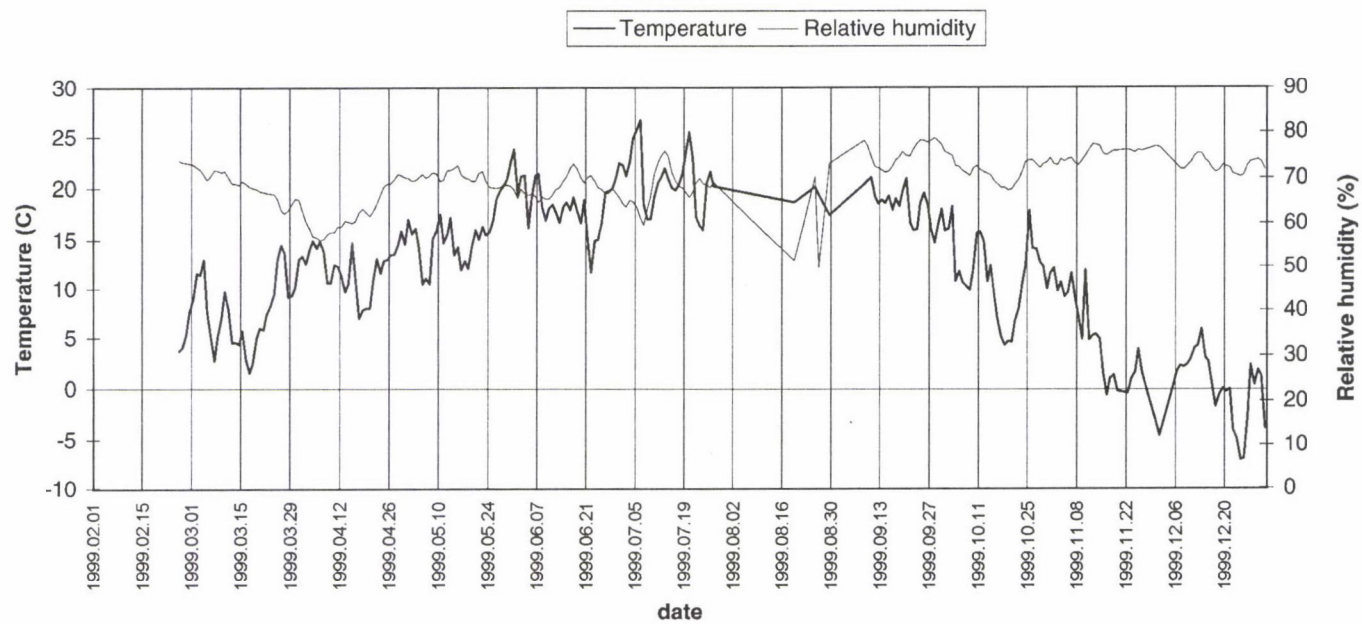


Fig. 1. Daily averages 1999

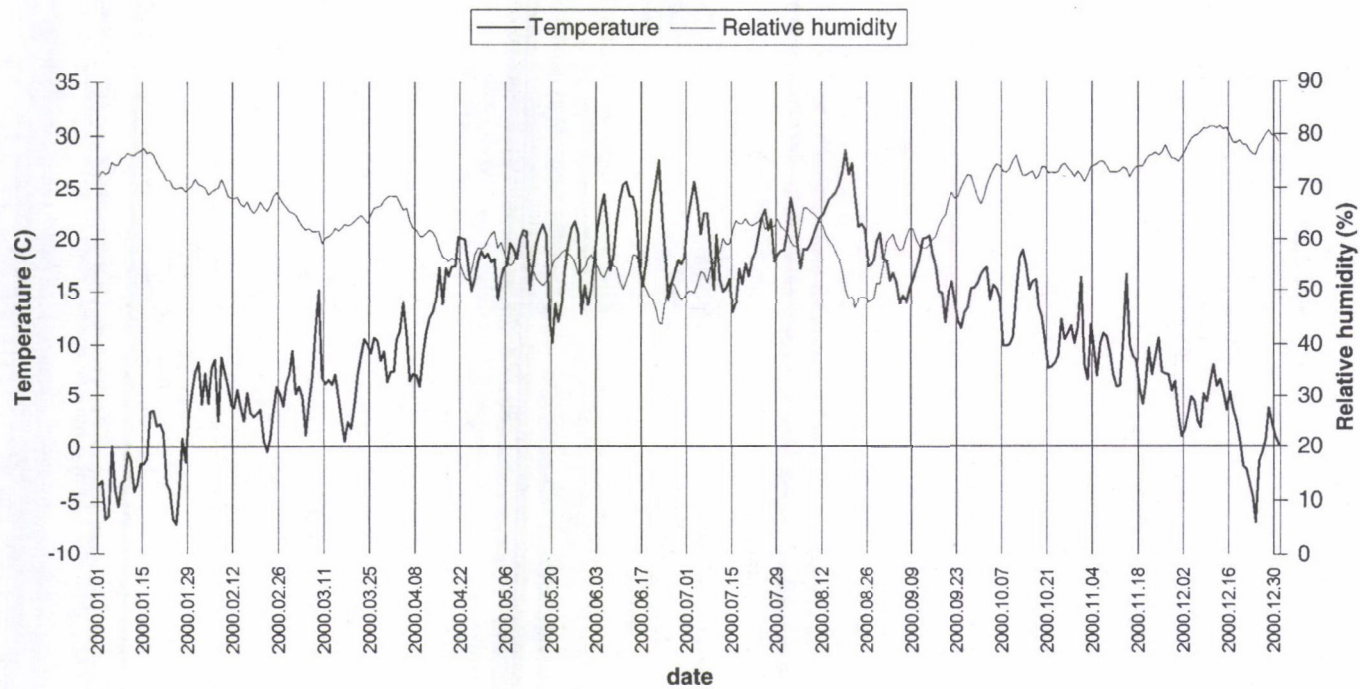


Fig. 2. Daily averages 2000

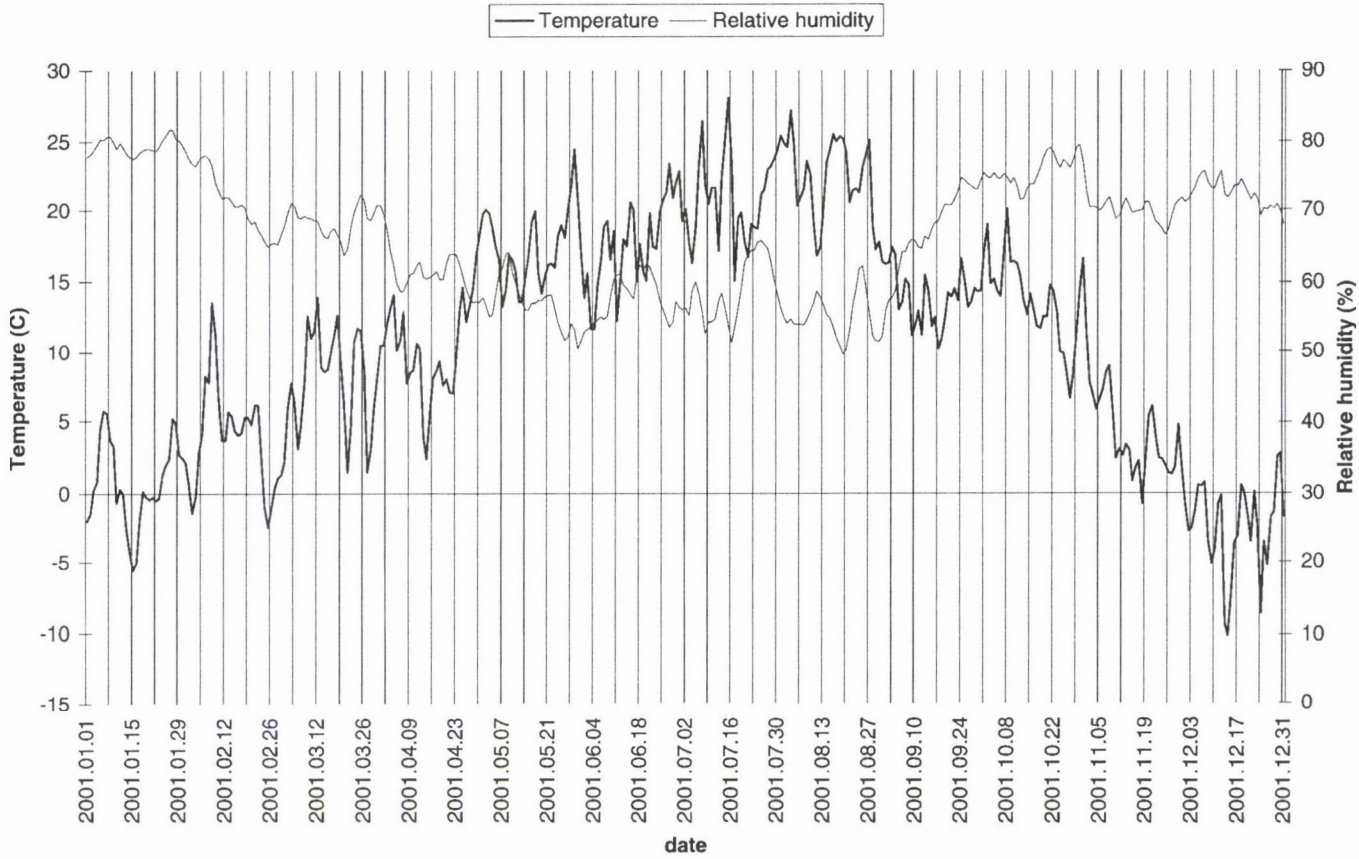


Fig. 3. Daily averages 2001

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